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ARIZONA MEDICINE
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Original ARTICLES

ANESTHESIOLOGY AND ITS PRACTICAL ADAPTATION INTO GENERAL MEDICINE AND SURGERY

Edward B. Tuohy, M.D., M.S. (Anesthesia)
Professor of Anesthesiology

Georgetown University Medical Center
Washington, D. C.

Anesthesiology, has made most of its strides, at least with the medical profession, during the last twenty years. Prior to that time our numbers were so small that the dissemination of what information was available necessarily had to be rather limited. The last World War however was a great impetus for this specialty and many of those actively engaged in anesthesiology today had the opportunity of serving with surgical auxiliary teams in various hospitals at home and abroad during the last war. It followed quite naturally that the younger surgical men who were also actively engaged in the last war became very closely associated with at least a limited number of anesthesiologists; and the combined talents and afforts of these groups demonstrated that considerable efficiency could be obtained in the handling of numerous casualties and, most important, that mortality – and morbidity – could be reduced.

Thus, since the demobilization following the last war the specialty has been confronted with a very definite shortage of qualified personnel due to the demand on the part of surgeons for experts trained in this particular field. Even the relatively large numbers of approved residencies in the specialty of anesthesiology we have not been able to keep up with the demand for well-trained individuals. It is the fervent desire of those in a position to be conducting training programs that more physicians will be interested in the field, and realize the number of very excellent opportunities available in almost any part of the country.

It is my hope that I can point out to you some of the basic intents of the specialty and wherein the talents of those qualified in this field can work into the overall pattern and fabric of medicine and surgery. There has been a gradual wear ing down of the older ideas that the anesthesiologist was merely a glorified term to hang on to the shingle of an "ether sprinkler". As a matter of fact, we have been criticized for the term anesthesiology because many people found it difficult to pronounce anesthetist! At any rate, in a somewhat lighter vein, I believe that the anesthesiologists have not introduced the real fancy terminolgy that our good friends the dermatologists have fostered.

In the last few years many of you have followed the activities of the American Medical Association and their action and attitudes with respect to this specialty. You have also, I am sure, seen the opposition from various and sundry sources exhibiting objections to the basic policies announced by the A. M. A. In order not to prolong this particular feature let me say that it has been established by the American Medical Association that the practice of anesthesiology is the practice of medicine and as such other personnel assuming such responsi

*Presented before Arizona State Medical Association, April 30, 1951, Tucson, Arizona.

bilities are of variance with the policies of the medical profession.

It is a fact that anesthesiology embraces not only the various methods and agents of anesthesia but also a number of closely associated ramifications probably the most important of which is resuscitation in case of respiratory arrest. Thus, some of the most dramatic situations which are encountered as frank emergencies in hospitals, whether they are medical or surgical require the expert abilities of one qualified to adequately support respiratory failure, initiate adequate pulmonary ventilation and also to have the dexterity and facility for the support of the circulation. One can readily see that there are numerous situations which can arise frequently wherein the anesthesiologist may be able to be of very definite assistance, for example, bulbar poliomyelitis, emergencies encountered in the neo-natal period, patients with pulmonary edema the emergency treatment of common poisons including barbiturates, the medical management of certain respiratory infections such as whooping cough and acute tracheolaryngitis, as well as the clinical entity of shock irrespective of the etiology.

In other words, a well-qualified anesthesiology service in a well-conducted hospital should be prepared to handle or assist in the management of a great number of emergency procedures. In many locations today the anesthesiology department is known as the "trouble shooter" for almost any type of situation requiring immediate action and treatment. It is a type of service which must of necessity be on a twenty-four hour a day basis, and able to function in a matter of a few minutes. It is my feeling that as soon as a patient is admitted to the emergency room of a hospital that one of the resident anesthesiology staff or attending men should be notified if there is any question about the efficiency of respiration or the circulatory system. Having adequate equipment and qualified personnel available will greatly enhance the handling of this type of case. A subsequent change in medical management can be directed according to the necessities of the patient, but many times valuable moments are lost when the patient is first seen when oxygen therapy for example, and adequate fluid support should be provided.

It is our feeling that for patients who have been severely traumatized and have a very low blood pressure, an arterial transfusion should be considered. It is not that intravenous support of blood pressure is, as a rule, unsatisfactory, but the point is rather that arterial transfusions in very critically traumatized patients well be much more effective in returning blood pressure to reseaonable levels and require a much smaller quantity of blood. One can state definitely that in sever cases of shock with marked hemorrhage that one pint of whole blood intra- arterially will effect the same response, but much more rapidly, as three pints of whole blood intravenously.

The method of administration is relatively simple. Most cases will require a cut-down procedure on the radial artery or the femoral artery in the absence of any frankly exposed artery due to trauma, etc. In many instances a needle may be successfully passed into the femorad artery, particularly if pulsations can be detected by palpation. If not, a surgical cut-down is entirely appropriate. Therefore, we are very much in favor of arterial infusions in the cases of acute trauma and provocatively in the prophylatic treatment of shock for certain surgical procedures, such as operations on the mitral valve of the heart, portocaval shunt operations, certain intracranial lesions, and in other types of cardiovascular surgery.

Briefly, the arterial method of infusion should be available in all hospitals with some simplified mechanical apparatus for administering the whole blood under pressure as it is needed. I emphasize simplified apparatus so that certain hazards such as the inadvertent administration of air or oxygen intravascularly can be prevented or reduced to a minimum. As a matter of fact, the whole concept of the prevention of sudden deaths on the operating table or in the emergency ward is predicated on the availability of blood immediately and the surgical fortitude to initiate cardic massage as soon as it is evident that there has been an arrest of the heart. By way of precaution however, I recommend that a scalpel should not be used indiscriminately on all cases in shock or when there is some doubt as to whether there is cardiac arrest. The point of emphasis lies in the split-second decision to initiate cardiac activity. The use of certain vasopressor agents as ephedrine sulphate, neosynephrine, and the pure pressor fraction of epinephrine, namely levo-arterenol should be considered. In the event of unanticipated or inadvertent hemorrhage during surgery we feel it is wise to have a sterile length of rubber tubing with a 15-

guage needle attached on one end readily available for the immediate insertion into any large artery that is exposed at the time of surgery. The free end of this tubing can be inserted into a blood filter device and by means of a simple air pressure device such as a blood pressure bulb, blood can be forced into the artery.

In passing, the advisability of intentional bloodletting in order to reduce systolic blood pressure must be carefully evaluated in each case. There are those who feel that the loss of blood at operation can be definitely reduced by this intentional lowering of blood pressure, and that the removed blood properly citrate for heparinized can be returned to the patient as needed. There is undoubtedly a definite place for this type of procedure in certain surgical interventions.

Another advantage of intra-arterial infusion that should be mentioned is the fact that there is less diffuse capillary oozing because of the relatively small quantity of whole citrated blood required to support blood pressure as contrasted with the relatively large amount of citrated blood ordinarily required when administered intravenously. The capillary oozing is, I feel, definitely related to the amount of citrate which is introduced into the general circulation when the intravenous route is used.

In conjunction with this observation let me interject, that on certain occasions when diffuse unexplained capillary oozing occurs during surgery, during or after a transfusion there is a possibility that there may be an element of improper matching of the donor and recipient. I do not make this a hard and fast rule that generalized oozing at the time of surgery associated with blood transfusion is a definite sign of the incompatibility of blood, but with what knowledge we have available at the present time seems to be one of the clues; at least under general anesthesia. As you know, it is very rare to have some of the other signs of the incompatibility of blood, such as urticaria or a pain in the lower back, demonstrated under general anesthesia. These are more apt to be seen in the conscious patient in the event of blood incompatibilities.

In normal and in operative obstetrics the anesthesiologist is in a position to be of definite assistance to the obstetrician not only in the choice of premedication and anesthetic agents and methods, but in a very important procedure of handling difficult resuscitation problems in the newborn. We have been following a suggestion in the management of Caesarean section babies particularly, and also the breech and version infants, of aspirating the stomach of the newborn with a very fine rubber catheter in order to prevent the aspiration of amniotic fluid, mucus, and other debris. We have observed that infants born via these routes practically routinely have between one and three ounces of fluid in their stomachs, and that this material is frequently responsible for respiratory complications. Briefly, our technique in handling the newborn is to aspirate the mouth and nares immediately and to supply oxygen with one of several types of resuscitating units, and then as soon as it is feasible to pass a small catheter into the stomach and aspirate the material which is present. The infant is held in the head-down position for this procedure. In certain instances because of respiratory obstruction the same catheter can be directed into the larynx and trachea for aspiration purposes.

There is little to be added to this relatively simple procedure, but I emphasize it to you as being a very valuable adjunct to the overall problem of handling the newborn infant. Supposedly, the explanation of this accumulation of mucus in the stomach of Caesarean section, version and breech babies is the absence of the squeezing action exerted through the normal birth canal. It is my feeling that all respiratory complications in the newborn should be carefully observed for at least twenty-four hours and oxygen supplied routinely. Very prompt catheter suction should be used discreetly with particular care being exercised to avoid any unnecessary trauma.

While discussing certain emergency situations associated with obstetrics and gynecology we should recall to mind the importance of adequate fluid replacement in the cases of ectopic pregnancy and certain abnormal eventualities reflecting themselves upon the placenta, such as placenta prae via, premature separation of the placenta, and rupture of the uterus. In this connection the anesthesiologist many times will be of considerable help in the delicate procedure of partial exsanguination and blood replacement in the management of erythroblastosis, or associated Rh–Hr variations. The management of the eclamptic patient has been thoroughly presented by many authors, and it ap-

pears on the basis of the work of Hingson(1) and others that conduction anesthesia may have a definite role in successful therapy of this condition. The use of continuous spinal anesthesia or epidural anesthesia will minimize the tendency for convulsive seizures, and produce a decrease in blood pressure. We have been able to substantiate the observation of Hingson, and feel that conduction anesthesia is one important type of therapy to be considered when this complication of pregnancy is encountered. It does not infer that other types of therapy, including the veratrine regime are not to be considered.

It is well to point out probably at this time that conduction anesthesia either by the continuous spinal or epidural route is valuable in cases of anuria except in those instances wherein the anuria is due to blood incompatibility. In my experience conduction anesthesia is not of much value in this type of complication. However, in acute renal complications in children, frequently associated with respiratory infections, and some of the exanthemata, conduction anesthesia is very much worthwhile in treating anuria.

As I mentioned previously there are a number of medical emergencies wherein the anesthesiologist can be of assistance, for example in certain types of poisoning such as that due to barbiturates. In these instances we are confronted chiefly with a respiratory and circulatory problem. It may be necessary to utilize suction bronchoscopy to remove substantial accumulations of mucus, and to insert an intratracheal tube for a varying period of time, and in the profound sub-lethal instances to carry on artificial respiration. A point frequently overlooked in this connection is the utilization of an artificial adult respirator of the type used for treating certain forms of poliomyelitis. In fact, a respirator of this type is invaluable for the treatment of any case of respiratory arrest. I suggest therefore that this piece of apparatus be considered in handling respiratory complications due to the ingestion of certain poisons, notably barbiturates. The judiicu osuse of certain drugs which are classified as analeptics should be considered. More precisely possibly and perhaps more effectual is the treatment of barbiturate poisoning by means of exchange transfusions, or dialysis by means of an artificial kidney. We have had two successful barbiturate poisoning cases in our institution successfully treated by the artificial kidney.

The Adaptation of Regional Anesthesia in Therapeutic and Diagnostic Procedures

Certain types of conduction anesthesia, ganglion block and individual nerve or plexus blocks have a certain value in therapy and diagnosis. At the present moment there is some confusion and difference of opinion in regard to the effectiveness, and the rationale in utilizing stellate ganglion block in the treatment of certain cerebrovascular accidents. On the basis of clinical experience alone, omitting the experimental data with respect to cerebral blood flow, stellate ganglion block, I believe, has proved iself to be a relatively safe procedure, and one which is definitely beneficial in certain types of cerebrovascular accidents.

The block in our experience has been of value particularly in cases of cerebral thromboses (particularly thrombosis of the posterioi interior cerebral artery), and in the more rare embolic and vasospastic cerebrovascular episodes. As far as cerebrovascular hemorrhage is concerned it is my feeling that stellate ganglion may possibly enhance the bleeding, but inasmuch as the diagnosis of hemorrhage in many instances is obscure the sequelae in cases of hemorrhage have not been notably outstanding. I do not know of any instance of cerebral hemorrhage which was made worse by the performance of this block.

It is important to perform the block as soon as possible after the accident has occurred and in our experience it has not been necessary from a clinical standpoint to repeat the injection more than two or three times. The greatest amount of benefit will be derived from the first block of the ganglion. The hazards of this procedure are few and they are namely: (1) intravascular injection and (2) subarachnoid injection of the anesthetic agent. Blocking of the sympathetic chain below the level of the stellate ganglion has been of definite value in certain cases of coronary thrombosis, particularly for the control of anginal pain. The sites of injection for the control of anginal pain are the upper thoracic segments namely, $T_{1\ 2\ 3\ 4}$ and occasionally $_5$. Elsewhere in the body certain individual nerves or plexuses of nerves may be blocked for diagnostic purposes when searching for the relief of pain, and the anesthesiologist can in many in-

stances be of considerable assistance in making a differential diagnosis.

It has been quite well established that regional block anesthesia is of definite benefit in certain vascular disorders such as thrombophlebitis, and in other neurovascular disorders of either an acute or chronic type. In fact, an improvement in technique is recommended at the present time over the conventional type of lumbar paravertebral block, namely, the continuous epidural type of conduction anesthesia. This procedure requires only one injection, is less painful and can be continued over a matter of days with very little discomfiture to the patient.

In addition, we have found the use of continuous epidural or continuous spinal anesthesia of definite value in the treatment of acute and chronic pancreatitis. The dramatic relief of pain in the acute cases of pancreatitis is quite significant. On certain cases we have maintained a continuous type of conduction anesthesia for as long as seven to ten days.

Parenteral Therapy

The anesthesiologist is vitally interested in the proper preparation of patients prior to surgery, and likewise during and after surgery. I believe it is important that there be close teamwork between the internist, surgeon, and anesthesiologist in effecting the proper type of fluid and protein balance for all patients undergoing major surgery. The hematocrit reading is important. A simple working rule that has been found to be reasonably accurate is that for every unit below 42 (hematocrit) the administration of 100 cc. of whole citrated blood is indicated. For example, if the hematocrit reading is 38 approximately 500 cc. of whole blood will be required to restore the hematocrit reading to a normal level.

There should be careful surveillance of adequate intake of carbohydrates, proteins, vitamins, and minerals. Inasmuch as carbohydrates are probably the most rapidly utilized foods, and supply approximately two-thirds of our body energy, and are particularly important in the sparing action on proteins it is important that we consider carefully the administration of these substances.

For a long time, we have been in the habit of using dextrose solutions in water as a source of carbohydrates. More recently, however, we have found that the use of fructose (invert sugar) is a definite improvement over dextrose for intravenous administration. Weinstein (2) has shown that:

> "When 50 Gm. of invert sugar given in 500 cc. of water at a rate of 1.5 Gm. per kilogram per hour, or in 34 minutes to the average adult, there is 99.2 per cent utilization and assimilation.(3) When 50 Gm. of dextrose are injected at a rate of 0.77 Gm per gilogram per hour, a process consuming 69 minutes or twice the time required with invert sugar, the amount utilized is 94 per cent.(3)"

The use of invert sugar therefore is definitely merited in parenteral therapy because it will reduce the time required for intravenous infusion, and prevent the long tiresome intravenous treatment. This type of carbohydrate therapy can be incorporated with various protein hydrolysate preparations, and also successfully augmented with adequate amounts of essential vitamins.

Closely associated with the problem of parenteral feeding and therapy is the consideration of the use of intravenous alcohol, chiefly for two purposes: first, for its sedative and analgesic action and secondly, for a source of caloric intake.

The sedative and analgesic properties of 7.5 per cent alcohol are dramatic in those patients operated upon under regional anesthesia, including caudal, epidural, spinal, nerve block, and infiltration types. Patients receiving it for preoperative apprehension, become relaxed, doze, become euphoric, and often are amnesic to the surgical procedure. Thus we are able to derive all of the advantages of regional anesthesia without excessive sedation and respiratory depression. The alcohol-protein-dextrose solution is administered after operation to control pain, or to materially decrease the intake of opiates and barbiturates. The rate of flow of the intravenous alcohol must be regulated to conform with each individual's tolerance in order to produce maximum analgesia without encountering restlessness and inebriation.

According to Best and Taylor (4) the minimal daily caloric requirements for an individual are approximately 200 calories. By adding alcohol, which has a caloric value of 7 calories per gram, to intravenous fluids the daily requirement may be maintained without exceeding a normal fluid intake. Thus, from each 1000 cc. of the above solution 820 calories are available:

7.5 % Alcohol =60 Gm.=420 cal.

5 % Protein hydrolysate =50 Gm.=200 cal
5 % Dextrose or invert sugar=50 Gm.=200 cal.
820 cal.
per 1000 cc. of solution

It is evident, therefore, that a daily intake of 2000 cc. of the above solution of 7.5 per cent alcohol, 5 per cent protein hydrolysate and 5 per cent dextrose would approximate the basal metabolic requirements for a patient under basal conditions of bed rest.

At this point it is significant to point out the fact that in maintaining adequate caloric and fluid intake in children with small, or poor veins, that parenteral feedings can be given deep into the muscle beneath the fascia lata with relatively little discomfiture. If hyaluronidase is added to the infusion mixture this material will definitely enhence the diffusibility and absorption of the fluid.

There are valuable adjuncts to intravenous therapy in certain cases where the veins are not particularly plentiful, or where they are difficult to locate. A small piece of plastic tubing, nine or ten inches in length, can be introduced through a suitabe gauged needle, thence into the vein, and advanced for a distance of one inch or so, subsequently removing the needle leaving the catheter within the lumen of the vein. With reasonable care the plastic tubing can be kept patent and free from blood clots. The incidence of reaction about or within the veins has been minimal. Such an arrangement has been used for continuous intravenous infusion frequently for as long as forty-eight hours. There are varying sizes of plastic tubing that may be used. The larger caliber tubing is required for blood transfusions. A fourteen-gauge needle is usually needed to accommodate the larger size plastic tubing.

Summary and Comment

It is my desire to point out the various places in medicine and surgery wherein the talent and skill of the anesthesiologist can be utilized. The well-qualified specialist in this field should not be limited solely to his ability for the administration of anesthetic agents. He should likewise not limit himself to the mere technical aspects of therapy. There should be a very wholesome relationship between the surgeon, internist, and anesthesiologist and by means of modest representation the value of modern anesthesiology can be sincerely appreciated.

The specialty of anesthesiology offers a very excellent field for careful clinical investigation which can be closely tied in with the basic sciences. In fact, it is amost essential for the proper progress of anesthesiology to work hand in hand with the fundamental sciences of physiology, pharmacology, pathology, etc. Without this linkage in basic research the improvement in methods of handling anesthesia would be impeded. At the present time one of the most urgent needs in the field of anesthesiology is the type of information which can be gained from those who are qualified to understand the intricacies of the electro-encephalograph. Up to the present time there has been little progress in developing precision instruments which will help to eliminate some of the "guess work" incident to the administration of anesthetic agents. It is my feeling that electroencephalography will materially assist in obtaining more accurate and specific information concerning the mechanism of anesthesia and the effect of certain agents and combination of agents on the higher centers. It is quite possible that information will be made available with the aid of precision instruments such as the electroencephalograph to detect the onset of surgical shock. I believe that anesthesiology has been carelessly termed an ancillary specialty and I sincerely hope that well-qualified individuals in this field will be able to dispel the notion that the management of safe anesthesia is a simple matter. It is a much more complex problem than is generally recognized.

In closing, may I repeat the statement which has been made by others that good surgery more than deserves competent anesthesia and that mediocre surgery requires it. We have definitely passed the era of simply providing anesthesia, and are intimately tied up with the problem of maintaining safe anesthesia.

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THE DIAGNOSIS AND TREATMENT OF SMALL BOWEL OBSTRUCTION

M. W. Merrill, M. D. Phoenix, Arizona

This is a discussion of a few of the points relative to a serious abdominal condition. A condition which even now, with constantly expanding knowledge of basic physiology and advanced methods of medical and surgical treatment, has a countrywide mortality which is still probably well over 20%. This condition is acute small bowel obstruction. It would not be feasible to discuss intestinal obstruction as a whole including the large bowel. The conditions are so different in their manifestations, physiology, etiology and treatment that they readily fall into separate categories.

A very brief review of the functional anatomy of the intestinal tract is in order. That portion of the upper gastro-intestinal tract derived from the foregut has to do with digestion and receives its blood supply from the celiac axis. This includes the stomach and the duodenum. The jejunum, the ileum, and the right half of the colon are derived from the midgut, receive blood supply from the superior mesenteric vessels, and have to do principally with absorption. The small bowel, primarily the ileum, is concerned chiefly with food absorption from its liquid contents, while the right half of the colon absorbs water and salt. The left half of the colon, the sigmoid, and the rectum are derived from the hindgut, receive blood supply from the inferior mesenteric artery, and is concerned with the storage and expulsion of nonabsorbable residue.

It is the chain of events which follows the interruption of the normal downward stream in the small bowel with which we are concerned today.

Obstruction in the small bowel can be further divided into high obstruction, usually in the jejunum, and low obstruction, in the ileum. The latter is by far the most common, and roughly comprises about 90% of all small bowel obstruction. The level of the pathological process in the small bowel determines the physiological changes which follow the obstruction. A high bowel lesion leads to rapid loss of water and chlorides because of excessive vomiting. This in turn lowers the blood chloride and unless replaced, a general breakdown of cell protoplasm follows. Lower obstructions in the small bowel are slower to produce the excessive fluid and chloride loss, but are more apt to result in bowel damage due to circulatory disturbance. In general, the higher the obstruction, the more rapid and the more profound is the pathologic physiology, while the lower the lesion, the greater the chance for interference with viability of the bowel. Obviously, a full coverage of all of the physiological changes in the gut, the blood, the tissues and the organs in small bowel obstruction cannot be accomplished in the allotted time. Suffice it to say that an understanding of these processes is essential to intelligent treatment.

The causes of small bowel obstruction are many and varied. In general, postoperative adhesions lead the list. Strangulated hernias of various kinds are next. Other causes include inflammatory adhesions, intussusception, volvulus, and vascular occlusion. Gallstones may get into the ileum and produce obstruction, and metastatic and primary malignant tumors are other factors. Intestinal polyps, Meckel's diverticulae and other rarer lesions are occasionally found.

The diagnosis of small bowel obstruction is usually not difficult and may in most cases be readily established. Whether the obstruction is of the open loop type with a free reverse passage of intestinal contents, or the closed loop type with impending bowel damage, is another matter. Distinction of those cases in which surgery is required immediately, or relatively soon, and those cases which can be treated by conservative medical means and prolonged bowel decompression, frequently requires the most careful surgical judgment. This must include evaluation of the history and all of the clinical and laboratory findings. The surgeon in these cases shoulders a grave responsibility. It is the neglected or imperfectly diagnosed case that goes on to bowel rupture, peritonitis, and frequent death.

As is usually true, a careful history of the onset and course of the present illness, and a knowledge of the past history is essential. This

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is particularly true with reference to previous abdominal surgery or the presence of known hernias. The symptoms are quite characteristic, and pain is the outstanding one. This is severe, usually comes on suddenly, is colicky, recurrent, and continues despite vomiting in the early cases. Later, if strangulation and bowel damage is present, the pain becomes more constant and is associated with development of abdominal soreness. Regurgitant vomiting is the next most common symptoms. It comes on early and with great severity in high bowel lesions, and always develops relatively soon even in low ileal lesions. Excessive quantities of fluid, chorides, and digestive juices are lost by this route. Early in the obstruction, this comprises a major portion of the vomitus, and as the disease progresses in the lower and more common lesions, the vomitus becomes foul and feculent in character. Associated with the vomiting, the patient is frequently aware of borborygmus. Distention, often more real than apparent, is present early in the condition and is usually confined to the stomach in high lesions and to the lower abdomen in low obstruction. Distention progresses as the disease develops, particularly if adequate suction decompression is not being employed.

Constipation is an unreliable symptom in small bowel lesions, and gas and fecal material may be passed in several enemas, even with a complete obstruction. This should not be relied upon for diagnosis.

The clinical and laboratory findings vary with the severity and the completeness of the obstruction, and the progress of the pathological changes. Audible borborygmus, associated with colicky pain, is highly suggestive. In most of the cases, the bowel sounds are high-pitched and gurgling, occurring in rushes. If the bowel becomes distended and paralyzed, or if peritonitis is developing, the abdomen becomes relatively silent. Early in the disease, the patient shows little or no dehydration and the pulse, temperature and blood pressure are at or near normal. Later, fever develops and if bowel damage is developing, the pulse becomes progressively more rapid. This sign is of value in distinguishing between operative and non-operative treatment. Another important finding is the white blood count. This will usually be around 12,000 to 14,000 with a shift to the left, even in early lesions. As the bowel damage progresses, the white blood count consistently elevates and the shift to the left becomes more pronounced. Dehydration develops rapidly if unrelieved. In severe strangulating obstructions the pulse is rapid, weak and thready. The skin is cold and clammy, and a state of shock is present. The abdomen is rigid, distended and tender. Abdominal soreness and the presence of rebound tenderness indicate impending or actual bowel damage with exudation and peritoneal irritation. Rupture of the bowel produces the characteristic findings of a spreading peritonitis. One of our most valuable adjuncts in making a diagnosis of small bowel obstruction is the use of the x-ray. Flat plate studies of the abdomen unerringly reveal small bowel obstruction in the great majority of cases. Not only this, but the trained roentgenologist frequently tells us the extent of the obstruction and the approximate location of the lesion. The finding of isolated gas-filled loops of small bowel are diagnostic of obstruction, and even in high lesions with no gas-filled loops visible, the absence of free gas in the large bowel suggests the high condition.

X-ray studies of the abdomen cannot be too strongly urged in all suspected obstructions. In fact, in any of the obscure abdominal conditions, the lead to proper diagnosis may be obtained.

Other laboratory procedures, such as the blood urea nitrogen, the carbon dioxide combining power, chloride determinations, and serum protein studies, are of value in treating cases of prolonged obstruction with severe physiological disturbances.

If the mortality of acute small bowel obstruction is to be lowered two things are necessary. First, the public must be enlightened and educated to these emergency cases, so that they will seek earlier medical care. Secondly, the medical profession must be continually alert to apply our present day knowledge to the diagnosis and to more adequately treat these patients early in the illness. The later the patient is seen, and the greater the procrastination on the part of the physician, the higher the mortality rate will be.

Intestinal decompression, since Wangansteen's first reports on this work, has become an integral part of the pre and the postoperative treatment. This is accomplished with either gastric or duodenal suction, or by the passage of a Miller-Abbott tube. It is here that a word of

warning must be interjected. Dr. William R. Moses is correct, when he says that the Miller-Abbott tube has no place in the treatment of acute mechanical small bowel obstruction. The time element required for successful passage of a Miller-Abbott tube is too long in these cases, and to wait for this is courting disaster. Furthermore, cases are on record where, with a perfectly functioning Miller-Abbott tube and a decompressed bowel, a rupture and peritonitis have occurred. Too often, this procedure gives the doctor a false sense of security. In most acute cases, all the decompression necessary can be carried out with gastric and duodenal suction rapidly and effectively. Postoperatively, this is sufficient to control distention, even after extensive resections.

The greatest use of prolonged decompression is in the postoperative paralytic ileus with distention and obstruction. Most of these cases will respond well to conservative measures, including suction and replacements of fluids, proteins and electrolytes.

In early obstruction before distention is marked, fluid loss is great, and the general condition of the patient is satisfactory, immediate operation may be performed. It is in this group, where surgical treatment is utilized before the serious results of obstruction become apparent, that the most gratifying results are to be obtained. It is here that extensive resections can be avoided, and the patient restored with a minimum of reaction. If seen later in the disease, surgery must be delayed for a few hours. In high lesions, fluids and electrolytes must be replaced as rapidly as possible. In low lesions, if strangulation has occurred, present or impending shock must be combatted with large amounts of plasma and blood. Fluids must be replaced, and in all cases, gastric or duodenal suction instituted promptly. A word should be said here about the causes of the shock syndrome seen in acute small bowel obstruction with strangulation and vascular impairment. It has long been thought that various toxins formed at the site of the obstruction contributed to this state of collapse. However, adequate replacement of proteins, blood and electrolytes usually restores these patients to a satisfactory operative condition. Many surgeons now think the shock picture is produced by the excessive loss, by transudation into the bowel wall, the bowel lumen, and the peritoneal cavity, of first plasma and later red blood cells. This loss is caused because venous occlusion always precedes arterial occlusion in acute bowel obstruction, leading to capillary seepage. The process is not as evident in strangulated hernias, probably due to the enveloping peritoneal sac. Another word of warning—even after successful release of strangulation and vascular obstruction, restorative measures should be continued to combat capillary seepage, which may continue for hours following relief of the obstruction.

As soon as patient restoration is completed, which usually requires only a few hours, operation can be performed. The anesthetic of choice is probably spinal, supplemented by oxygen and sodium pentothal. This gives the greatest relaxation and a minimum of aspiration danger. If general anesthetic is used, the curare-like drugs are helpful in keeping the frequently distended bowel quiet.

The operative incision should be as physiological as possible to prevent future incisional hernias. The operative procedure, generally speaking, should be the minimum required to successfully relieve the obstruction. This may require only the cutting of a single adhesion, or it may involve extensive resection of the small bowel. In resections, many doctors prefer side-to-side anastomosis after closure of the cut bowel ends. Recently, more and more surgeons are shifting to end-to-end anastomosis. It has been shown quite conclusively that if the small bowel is sectioned at an angle with the longer segment at the mesenteric attachment, end-to-end anastomosis produces a better blood supply with less danger of leakage than does the side-to-side procedure.

Enterostomies for the relief of distention and exteriorization procedures are being used less and less. Better physiologic restoration, improved surgical technique, and the use of the antibiotics and chemotherapy, is making the use of these procedures less necessary all of the time. Avoidance of these procedures contributes to the lowering of mortality in small bowel obstruction.

Postoperatively, suction should be maintained two, three or four days, until healing occurs, and the edema at the suture line has subsided.

A few representative cases wil be described to re-emphasize some of the factors that have been presented.

CASE NO. 1—Mrs. A. R., St. Joseph's Hospital,

December 1941: This 42-year-old woman, mother of three grown children, had pelvic surgery for retroversion of the uterus ten years prior to her attack. Some type of a suspension had been unsuccessfully performed, and an adhesion band was stretched across the fundus above the bladder. This patient became ill with severe colicky abdominal pain around 9 P.M. in the evening. This was followed by severe recurrent vomiting. I saw her at 3 A.M. She was admitted to the hospital, and a white blood count was found to be around 12,000 per cu. mm of blood. There was soreness across the lower abdomen and some muscle guarding. The urine was normal. Flat plate revealed an isolated loop of small bowel containing gas in the pelvis. The patient's condition was excellent, and immediate operation was done. Eight inches of obstructed small bowel were caught beneath the adhesion across the uterus. The operation consisted of removing the band. The bowel viability was good, and the postoperative course was smooth and uneventful. Early operation saved this patient a serious illness.

CASE NO. 2—Mrs. D. S., Good Samaritan Hospital, June 1942: Patient aged 42; married, had had no children or previous surgery. She developed a mass low in the right side, while doing her housework. This was associated with severe recurrent pain and vomiting. I saw her about three or four hours after the attack began, and found a strangulated right femoral hernia. She was operated, soon after admission, from above the inguinal ligament. Reduction was relatively easy, and the bowel was not severely damaged. The hernia was repaired. The patient recovered without trouble. This case was easy, but the patient was thin and the mass was readily palpable. The diagnosis of an incarcerated femoral hernia is far more difficult in obese ptients, and can be overlooked quite easily if not hunted for, in obscure obstructive cases.

CASE NO. 3—Mr. J. V., St. Monica's Hospital, March 1946: A 75-year-old Italian; this man was never previously operated. He was admitted with nausea, vomiting, and abdominal pain, which subsided soon after arriving at the hospital. Three or four bouts of similar nature occurred, and a mass appeared in the right upper quadrant. Fever and leukocytosis were present; abdominal distention developed, which was controlled by continuous Wangensteen suction. The patient succumbed to generalized peritonitis ten days after admission, and on autopsy a Richter type hernia was found with a partial strangulation and subsequent perfortion of the ileum. This occurred in the left inguinal ring. This patient died of a peritonitis. The mass in the right upper quadrant was an acute cholecystitis. Although the patient was seen by both medical and surgical consultants, surgery was never believed to be indicated; yet had it been possible to make a diagnosis early, this man could have been saved. Incidentally, the obstruction was intermittent in character and the x-ray failed to aid in the diagnosis.

CASE NO. 4—February 1949, St. Joseph's Hospital, Mr. G. H. age 74, a minister: This man had never before been ill in his life, that is of any serious nature. He became ill in the evening with severe, cramp-like abdominal pain and regurgitant vomiting. This persisted during and throughout the night, and he was seen the next morning with some distention. He was admitted to the hospital. His white blood count was found to be 12,900 per cu. mm. of blood, 91% polys, temperature 100, pulse still good, but quite rapid. Early dehydration and evidence of impending shock were present. The abdomen was diffusely tender; more marked in the lower right quadrant. Rebound tenderness was present, and bowel sounds were high-pitched and active. An x-ray of the abdomen revealed an isolated loop of gas in the small bowel, and the roentgenologist reported mechanical small bowel obstruction in the upper ileum.

Fluids and plasma were given, and upper abdominal suction started. Blood was secured, and operation through a right rectus incision was begun about three hours after admission. About eighteen inches of small bowel had become caught beneath what appeared to be a congenital band on the undersurface of the mesentery to the small bowel. The incarcerated gut was dark and gangrenous, and vascular obstruction was well advanced. Resection in healthy tissue was accomplished and continuity reestablished with side-to-side anastomosis. Closure was without drainage, although there was considerable serosanguinous transudate in the abdominal cavity. The only postoperative complication was difficulty in reestablishing bladder function, and within two weeks after discharge, this patient had to be readmitted and a transurethral resection performed. His recovery on his second

admission was also uneventful. Early operation and intensive replacement and restorative measures aided greatly in this happy outcome.

CASE NO. 5—St. Joseph's Hospital, January 1948, Mrs. E. A., age 49: Married, the mother of four children; this patient had a pelvic laparotomy in 1937; somewhat indefinite as to what was done, but the appendix was known to have been removed. In March 1947, I did a vaginal hysterectomy. This route was chosen because the uterus was prolapsed downward, and there was an associated cysto-urethrocele and rectocele. The operation was somewhat difficult technically because the uterus was quite large, and there was a loop of small bowel adhered across ths fundus. Recovery was smooth. December 31, 1947, this patient awakened at 4 A.M. with a severe, recurrent, colicky abdominal pain. This was followed in several hours by regurgitant emesis, which failed to relieve the pain. Obstipation was present, and repeated enemas gave no relief. I saw this lady at 8 p.m. that evening, and immediately hospitalized her. Examination revealed an acutely ill patient with a rapid pulse, white blood count of 14,000 per cu. mm, 89% polys, and a normal urine. Temperature was 99. The blood pressure was normal. The bowel sounds on admission were not very active. The abdomen was tense and tender Rebound tenderness was present, and a pelvic examination revealed what was thought to be an indefinite mass, which was low in the abdomen and high in the pelvis. X-ray films of the abdomen showed isolated loops of gas-filled small bowel in the right lower quadrant, with some extension across the midline, and there were also some loops containing gas present in the left lower quadrant. The x-ray diagnosis was acute mechanical small bowel obstruction.

Hydration, nasal suction and blood were started, and the patient was operated at 11:30 P.M. through a low midline incision. An acute volvulus was found. About 22 to 24 inches of small bowel were so tightly tied together that disentanglement could not be made, even after removal. The mass was gangrenous. The abdomen contained a large amount of serosanguinous fluid. Resection in healthy tissue was followed by side-to-side anastomosis. 1000 cc. of blood was given at the time of surgery, and constant upper abdominal suction maintained. This patient had no postoperative complaints, and her course was smooth. She has remained well since her operation.

CASE NO. 6—R. T., boy aged 17, St. Joseph's Hospital, operated March 24, 1950: 6 weeks prior to this admission, this boy suffered an upper abdominal gunshot wound. The bullet entered just above and to the left of the umbilicus. It passed just beneath the stomach, tore a large hole in the jejunum, struck a thoracic vertebra at an angle, and came out the left flank. At exploration, the jejunum was repaired and the retroperitoneal bleeding was controlled with gelfoam gauze. His recovery was relatively uneventful, after two rather stormy days. He went home at the end of nine hospital days. On March 24, he developed intermittent abdominal pain and vomited once or twice. This was six weeks following his original injury. When seen, he had a white blood count of 13,600 per cu. mm. of blood with 82% polys. The lower abdomen was rigid and tender, more marked in the right lower quadrant. This appeared to be a typical case of acute appendicitis, although we were somewhat suspicious because of his recent gunshot wound. However, despite this, he was opened through a McBurney incision, which proved to be inadequate when a mass of small bowel was found adherent and obstructed in the area of the sacral promontory on the right side. The McBurney incision was then closed, a lower right rectus incision made, and the obstruction relieved by blunt and sharp dissection. This obstruction apparently was caused by an inflammatory reaction set up in the lower abdomen by the irritating digestive juices spilled out of the jejunum at the time of his gunshot wound. His postoperative course following this operation was uneventful.

CASE NO. 7—Mrs. E. A., Good Samaritan Hospital, September 1949, 26 years of age: This patient had been operated on two times previously, for an appendicitis and an ovarian cyst. She developed characteric pain and vomiting, distention, and elevated white blood count. Abdominal soreness was not marked. Nasal suction failed to relieve the patient, and x-ray revealed several gas-filled loops of smal bowel. At operation, the sight every surgeon dreads to see was presented. . . . An extensive mass of intra-abdominal adhesions, with many adherent loops of small bowel. Extensive adhesolysis was done—I do not know yet which specific adhesion caused the obstruction. At any rate, she

recovered without trouble. Since that time, I have had to remove her gallbladder. She was delivered a baby, and I have hospitalized her four times for varying grades of recurring obstruction. Fortunately, she has not yet again required surgery. Every surgeon is familiar with these unfortunate people, with their many scarred abdomens. This particular type of a case should be carefully analyzed and closely followed during attacks because frequently conservative treatment can save the patient another scar.

Information on three more cases, of obstruction, of other physicians, are all of interest. An acute small bowel obstruction was present in a woman aged 74. Surgery revealed an ileal obstruction due to a large gallstone. Removal was followed by recovery. Four months later, she obstructed again and after a period of observation, was reopened. At this time, no cause for her symptoms could be found, until on the third postoperative day, when the patient passed a large gallstone into the bedpan. Apparently, under the anesthetic or near the time of surgery, the stone had passed through the ileocecal valve and escaped.

A high bowel obstruction of especial interest was recently treated. This patient, a female, aged 64, developed a high bowel obstruction with profuse vomiting. Under Wangensteen suction and restorative measures, she improved temporarily, but when her bowel sounds began to diminish and the pulse to accelerate, she was explored. A sausage-like tumor was found in the midjejunum. This was 2½ cm. wide and approximately 8 cm. long. It was removed by incision into the jejunum, and later was determined to be an unchewed, undigested cantaloupe pulp. This patient responded well to her surgery, but she died 12 days postoperatively from a pulmonary embolism. This represents a most unusual case of obstruction—an intestinal phytobezoar.

The third patient, a female, aged 47, was under observation for two days after onset of abdominal pain and vomiting. She gradually developed what was thought to be a complete small bowel obstruction, and on operation she proved to have an intussusception, which was produced by an intestinal polyp that began travelling down the lumen of the small bowel. Resection in this case was followed by recovery.

SUMMARY: (1) Acute small bowel obstruction has a countrywide mortality of over 20%, making it a formidable surgical problem. (2) Early surgery in mechanical obstruction is strongly urged. Conservative measures should be reserved for those cases where the surgeon is sure that small bowel damage is not being done. (3) Emphasis is placed on a careful history and physical examination with full utilization of the laboratory and the x-ray. The latter is particularly helpful. (4) Physiologic restoration before and during surgery is of primary importance in these cases. (5) Surgical and anesthetic techniques are briefly discussed. (6) Ten illustrative cases are reviewed.

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INDUSTRIAL UROLOGY

Paul L. Singer, M. D.
Phoenix, Arizona

The discussion of the urologic aspects of some industrial injuries recalls a very ancient problem. One of the classical illustrations of the relation of occupation to disease was the discovery of a high incidence of scrotal cancer in chimney sweeps. This finding was soon followed by others of causal relationships, until the medical student of the eighteenth century was admonished to ask every patient his occupation as a guide to diagnosis. This recognition of the relationship between occupation and possible disease is, of course, now universal. Yet as recently as 1939 many States defined compensation as relating to industrial accidents only, not recognizing industrial disease as being compensable. Only in the past few years have States changed the wording of their laws to read "Industrial injuries" instead of "Industrial accidents." This reluctance, of course, was due to financial considerations in fear that the recognition of the causal relationship between disease and occupation would incur additional liabilities and costs. And while an accident is a dramatic occurence and the cause and effect are promptly obvious, the exposure to a noxious agent and the onset some time later of a disease is a less tangible. With a shifting and migratory population and with brief terms of employment the correct cause is often obscure, and the blame is placed with only considerable difficulty. An estimate made in Wisconsin some years ago showed that about four per cent of all compensation cases are medical in nature; yet I wager these four per cent caused more headaches than the 94 per cent accidental cases.

The development of the aniline dye industry, especially in Germany, was followed by the development of bladder carcinomata(1), in workers exposed to the naphthol and zenzol compounds used in the manufacture of the dyes. It took only a little study to associate the cause and the effect in these cases. Only the strictest supervision of ventilation and prevention of skin contact succeeded in the reduction in the number of cases of bladder carcinoma. It took a lot longer to impress the danger on the workers themselves, and, in fact, they had to be protected from their own carelessness.

There are other less well known and newer chemicals with a specific action on the urinary bladder and kidneys. The rapid rise of the synthetic industry and great advances in organic and synthetic chemistry has been followed by new syndromes of renal irritation with end results that we cannot as yet foresee, since enough time has not elapsed, and the worker population has not been steadily employed at these newer skills. We can understand this if we recall that the aniline dye tumors were found in older men who had been employed for between twenty and twenty-four years at this occupation.

Many chemicals exert an irritating effect on the renal tubules during their concentration and change in the hydrogen ion level. The concentrated chemical then irritates the bladder epithelium. There have been a number of cases of hematuria reported in chemical factory workers(2) in which cystoscopy and retrograde pyelograms did not show any evidence of tumor formation. Recently Lyons(3)(4) reported six cases of hematuria in workers handling a specific chemical 5-chloro-orthotoluidine without finding any bladder tumors.

One of the commonly used and well known chemicals that has not been recognized as dangerous to the kidneys is Carbon Tetrachloride.(5) This fluid is used extensively. In Phoenix it is used in various cleaning and dyeing plants, and it is used carelessly. In 5000 routine admissions to the U. S. Marine Hospital, Farrier and Smith found 12 cases of carbon tetrachloride poisoning with evidence of renal damage. Of these twelve cases five died. Since the average physician thinks of carbon tetrachloride poisoning as an acute and rather dramatic disease with sudden onset and a liver death, they overlook the chronic effects on the kidneys. The liver damage is often slight and transitory and may disappear in 48 hours. Only small amounts of the poison need be absorbed at a time to cause fatal outcome. The transitory liver damage may soon be followed by lower nephron pathology, uremia and death.

Other chemicals dangerous to the well being

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of the urinary tract are trichlorethylene, naphthylamine, various paint thinners and turpentine. While I was Resident Urologist at the Hillman Hospital in Birmingham, Alabama I was confronted by many cases of hematuria in women of a lower economic stratum. It was the habit of these women to prevent pregnancy by the daily ingestion of a minute amount of turpentine—not quite enough to prevent pregnancy—but quite enough to bring about severe hematuria. The difficulty cleared up after the habit was discontinued.

In the State of Arizona where mining is pursued, the workers are exposed to various metallic dusts, their sulfides and other compounds. Cadmium, copper, nickel, lead, silver are all toxic in various halogen and oxide and sulfide combinations. All of these are renal irritants—the degree of irritation depends on the amount of the exposure, his preliminary conditioning by alcohol ingestion, his susceptibility to the agent, and other factors.

If the sole effect of these irritants above mentioned were the transient hematuria, cystitis and renal irritation there would be no great concern. But this is not so, since the irritated and hyperemic renal epithelium and vesical epithelium become weakened and subject to infection. I have seen a number of cases of severe intractable, incurable, advanced pyelitis in men exposed to smelter fumes, these men being camparatively young, vigorous and without any outward evidence of debility. They give a history of exposure to metal compounds ranging from a few weeks to a few years. They are copper smelter workers, underground miners mirror makers, storage battery operators. A recent case was exposed to minute amounts of mercury while silvering mirrors—without bothering to follow the precautions prescribed by his employer—and without noting any systemic effects, until he developed real mercurial renal poisoning. Others are seemingly without symptoms except for the laboratory findings of heavy pyuria. The intravenous pyelograms and retrograde studies show advanced and markedly deforming pyelonephritis. The infective organisms vary from case to case, but all are very resistant to therapy, and rapid recurrence is the rule, because the scarred renal epithelium has low resistance and is prone to relapse of the infection. Tracing back the histories there was evidence of gross carelessness in neglecting to use respirators, in careless inhalation of noxious fumes, lack of hand washing prior to eating, etc. and chiefly, in preparing the kidney for good reception of the poisons by freely imbibing in alcoholic beverages. It has been shown repeatedly that almost all of the industrial poisons that cause renal damage are much more toxic if the host is conditioned by alcohol intake.

A similar problem exists with regard to the formation of kidney stones in farm laborers, field workers, foundry men, in this our very hot and dry climate. We do know that renal calculi have a higher incidence here in the Southwest than in any other part of the country—this climate being similar to that of the Near East Asia—an area notorious for calculus formation in man. The prophylactic agent for the prevention of formation of calculi is an excessive intake of water and salt. If the employer assures a fairly accessible supply of cool, potable water and small salt tabets, and he permits the workers to go to the source and drink he does a great dea to prevent formation of stones. The rest is up to the workers, and the adage "You can drive a horse to water, but you can't make him drink" applies. The workers should have it impressed on them that a goodly water intake will be of great benefit.

A most recent industrial problem of urologic nature, one that will be met with more and more often because of the atomic age is uranium nephritis. Uranium salts are absorbed very readily thru various channels into the body. They circulate there and are quite harmless as long as they are the alkaline salt of uranium. They move through the body in combination with bicarbonates and gradually accumulate in the liver and fat tissue. They reenter the circulation in dilute form. As they pass thru the kidney tubules, however, the bicarbonates are reabsorbed as the body conserves the alkaline ions to mtaintain itself in electrolyte balance, and the uranium remains in the tubules as an acid salt. It promptly sets up a necrosis in the distal convoluted tubule, and the picture of a lower nephron nephrosis ensuies. The effect is similar to that seen with other heavy metals. A number of cases of this type of nephritis have been reported.(6) As the search for uranium deposits increases and the atomic age brings more people into contact with uranium this problem will be seen more and more often and will have to be safeguarded against. Fortunately

the presence of even small amounts of uranium in the urine can be readily detected—in fact it is a good method evaluation of the amount of uranium in the body—and so a ready check can be effected for industrial purposes.

Before leaving the chemical effects of various agents on the kidney and the bladder I would like to mention a practical aspect of these foregoing problems. I believe that renal lesions could be handled much more readily if all employers would screen their help more carefully before hiring them, especially in occupations that may have some inherent hazard such as copper mining, smelter work, heavy metals industries, etc. A recorded urinalysis, blood pressure, flat plate of the abdomen for stone, and a careful history would be of tremendous help in evaluating all cases should they come before a commission. The effort expended before hiring would be a great help before firing.

Having mentioned a few chemical problems there are some injuries due to physical agents that deserve mention. Since most of the traumatic lesions of the genito-urinary tract are self-evident and resolve themselves into proper treatment there is no need to discuss them. The secondary effect of extensive trauma on the lower nephron is also well known and need not be discussed.

There are two cautions in traumatic urology that well could be reemphasized. First—in all cases where blood appears at the meatus after crushing injury to the bony pelvis or perineum a catheter should be inserted into the urethra and the bladder. If the catheter can be passed, *it should be left indwelling.* Oftentimes there is a partial urethral tear that can be passed by before edema ensues, but when the second physician tries to pass a catheter he meets with deformity and is unable to pass a catheter, where the first physician had no difficulty at all. The indwelling catheter would prevent many suprapubic cystotomies. The second admonition is that in any case of injury to the flank an immediate intravenous pyelogram should be made to be followed in a few days by a second one, the two sets affording an excellent comparison as to the extent and progress of any renal injury.

There is another industrial urologic problem that requires much clarification. This is the problem of epididymitis in a worker where no direct blow has been sustained to the genitalia. The worker will give a history of a sudden stress, strain, misstep, a slipped foot, catching a heavy weight suddenly or unexpectedly etc. This is followed in a day or so by swelling of the involved epididymis which looks like a typical acute infectious epididymitis, has a prolonged period of hospitalization, is characterized by frequent recurrence, operation, unilateral sterility, absenteeism, residual tender scrotal contents and poor productivity. The pathogenesis is as follows: These patients have a chronically infected prostate gland, seminal vesicles and ejaculatory ducts to begin with or a combination of the above or any one of them alone. When a sudden stress is placed on the abdominal muscles the intraabdominal contents bear down on the perineum, and the man tightens his levator ani muscles to keep his perineum from sagging. The sudden compression squeezes these infected glands between the abdominal contents and the levator ani muscles where they are located, similar to one squeezing a tube of tooth paste between two fingers. The infected material is forced down the vas deferens into the epididymis and there sets up an infection. A similar experience awaits any physician who occasionally massages an infected prostate gland too vigorously only to have his patient return in a few hours or days with a full blown epididymitis. In classic animal experiments the vas deferens has been exposed to the scrotal skin. On voiding two streams of urine are seen to flow from the severed vasa, and any sudden rise in intra-abdominal pressure, such as a strain or cough is followed by a greater spurt out the severed vas. This shows that back flow down the vas clearly does exist.

We are confronted by a disabling lesion not the direct result of a blow to the organ involved. Claim for days and days of disability is submitted for adjudication. This problem has not been settled satisfactorily in Arizona, altho it has been under discussion. Other States, such as New York, have come out definitely with the ruling that unless the epididymitis is the result of direct trauma to the scrotum industrial liability does not exist. Some urologists express the opinion that even in the presence of direct trauma to the testis inflammation does not ensue unless there is preexisting infection present. However, most Compensation Boards ad-

mit the case compensable if proof of direct trauma is obtained.

The next problem concerns stress incontinence in older women who have had to be bedridden for industrial or other accidental causes not directly affecting the urinary tract. Middle aged or older women who have sustained a fracture and were necessarily bedfast for several weeks will bitterly complain on arising from their bed of being unable to contain their urine, and promptly blame the accident for their plight.

Recent studies on the physiology of micturition by fluoroscopy have shed a lot of light on this problem of stress incontinence in women with weakened pelvic floors, cystocele and urethrocele. In the normal individual in the ordinary course of voiding the first phase consists of relaxation of the Levator Ani muscles. thus permitting the floor of the bladder to drop below the level of the pubis and permitting a few drops of urine to flow into the relaxed funnel of the posterior urethral–trigonal dip This, in turn, is then followed by compression of the abdominal muscles voluntarily, with the compression of the bladder that follows, initiating contracture of the bladder wall musculature and relaxation of the vesical sphincter. Thus the flow of urine is initiated and completed. Stoppage of the flow is accomplished by elevation of the Levator Ani muscles, elongation of the trigone and closure of the funnel of the internal urinary meatus. In women with torn or stretched Levator Ani muscles the bladder is in a constant state of the first phase of urination and any stress will bring on the second phase at once. Only a continuous and steady constant effort to maintain some tonus in the pelvic floor keeps these women relatively dry. The prone position helps retain the urine since the weight of the abdominal viscera is off the pelvic floor. When these women are placed at prolonged bed rest they lose the little tonus left in their pelvic floors and when they arise they have become incontinent. Obviously the injury or accident has no direct bearing on the incontinence. We could help these women by insisting that they maintain pelvic floor tonus by exercising their muscles while at bed rest. This they can do by continuous focus of effort on the involved muscles. It is my opinion that from a compensation viewpoint there is no special merit to their claim for incontinence any more than there is for weakness of the leg muscles due to disuse.

This brief discussion is not a complete survey of urologic industrial problems, but aims to bring out the less clear points in an attempt to instigate the formulation of more clear cut opinions of industrial responsibility so that uniformity will guide the decisions in these cases.

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1313 North Second Street.

PHOENIX *Clinical* CLUB

MASSACHUSETTS GENERAL HOSPITAL CASE NO. 29381

The Case History in this discussion is selected from the Case Records of the Massachusetts General Hospital, and reprinted from the New England Journal of Medicine. The discussant under Differential Diagnosis is a member of the staff of the Massachusetts General Hospital. The other discussants are members of the Phoenix Clinical Club.

A fifty-one-year-old man, a factory worker entered the hospital because of acute abdominal pain.

One week prior to admission the patient developed upper abdominal "distress", the nature of which he was not able to describe well. It was apparently not related to food. There was no associated back or shoulder pain, nausea or vomiting, but he was forced to stop working. His bowel movements had been fairly normal with a laxative perscribed by his physician. At the onset of his present illness he contracted a "cold" after removing storm windows. There were no chills, fever or urinary disturbances or chest pain. He had remained in bed more or less constantly. On the night before admission the pain in the abdomen became worse and he developed chilly sensations. He was given a hypodermic by his doctor and sent into the hospital. There was no vomiting. His last bowel movement had been two days before admission, at which time he had had two loose stools. He had not passed gas by rectum since then.

Physical examination disclosed a moderately obese man with questionable cyanosis of the lips and fingernails. The skin was moist. The heart was not enlarged. A short systolic murmur was heard in the aortic region, which was not transmitted. The aortic second sound was greater than the pulmonic. The heart rate was regular and of good quality. The lungs were clear. The abdomen was flat. No peristalsis could be detected anywhere. There was voluntary spasms all over, but when the muscles were relaxed by flexion of the legs, there was variable response to palpation—once it was "sore", then "no pain", then "a little tender" and so on. No definite masses were felt. There was no costovertebral tenderness. Rectal examination showed no tenderness or masses. The prostate was slightly enlarged. There was no edema or ascites.

The blood pressure was 150 systolic, 80 diastolic. The temperature, pulse and respirations were not recorded.

Urine examination was negative. Examination of the blood showed a white-cell count of 16,200, with 84 per cent neutrophils. Three hours later the white-cell count was 11,300. A blood Hinton test was negative. An electro-cardiogram was interpreted as showing normal rhythm, at a rate of 80, with low T_2 and total inversion of Lead 3; Lead 4 was normal.

A roentgenogram of the abdomen showed considerable gas and fecal material in the proximal colon. The colon distal to the splenic flexure was collapsed. A film taken on the following day in the prone and upright positions showed several dilated loops of small bowel on both sides of the midabdomen as well as a large, single loop of bowel that appeared to be small intestine. There was also a small amount of gas in the colon in the region of the splenic flexure. An upright film showed fluid levels within several of the loops on the right side of the abdomen. There was no air beneath the diaphragm. A barium enema on the second hospital day revealed the passage of barium to the cecum and the terminal ileum without delay. There was a moderate amount of facal material within the colon that somewhat hindered the examination. No gross evidence of obstruction or definite evidence of ulceration or of a filling defect could be seen. There were two loops of slightly dilated air-filled small bowel in the left midabdomen. Barium passed through the ileum to the air-filled loops of bowel, and one loop gave the appearance of partially encircling a mass over the left side of the lumbosacral junction; the loop in question was somewhat narrowed and irregular in outline.

An electrocardiogram on the third hospital day was normal.

On the third hospital day the patient had a spontaneous bowel movement. Peristalsis was audible, and the abdomen flat. On further questioning it was brought out that the patient had had two former episodes of substernal pressure with radiation down the left arm, lasting three to five minutes and coming on while he was

working on a chair. These attacks had been diagnosed as angina pectoris and the patient was advised to live a moderately restricted life. Since then the patient had had no similar episodes.

A gastrointestinal series on the fifth hospital day showed that passage of barium through the pylorus was very slow. A large residue of barium was seen in the colon, especially in the region of the cecum, which was dilated. There was considerable gas in the hepatic and splenic flexures. Hourly films. showed slow passage of barium to the small bowel, and for a period of three hours no progression was seen. The stomach was almost completely empty at three hours, and all the barium was found to be in a few loops of the small intestine on the left side of the abdomen in the region where the air-filled loops were visible on the previous examination. At four hours, however, barium had passed through the narrowed loops previously described. Spot films taken over this region showed no definite evidence of ulceration. The narrowing was believed to have been due to extrinsic pressure. At four hours the head of the barium meal was in the region of the ileocecal valve, but had not entered the cecum. No mass could be deflnitely visualized.

Following the gastrointestinal series the patient was given an enema, with good results. He was seen twice that evening and appeared well. At about 4:00 the following morning he began to complain of gas pains, and another enema was given. Soon after that the patient was found to be sweating profuselv. The blood pressure could not be obtained. The abdomen was slightly distended. The pulse was about 120. Examination of the blood revealed a white-cell count of 29, 800, with 87 per cent neutrophils. Intravenous fluids were given, and a Miller-Abbott tube inserted. The patient's condition apparently improved throughout the day. The following night he passed 50 c.c. of bright-red blood.

The white-cell count on the seventh hospital day was 22,300, with 91 per cent neutrophils. The urine showed a two plus test for albumin. The nonprotein nitrogen was 44 mg. per 100 c.c., the protein 5.8 gm. The chloride was 92.8 milliequiv. per liter, the carbon dioxide combining power 20.6 millimols. The serum amylase was normal. A portable film of the abdomen showed no demonstrable air-filled small intestine. The stomach was filled with air, and the colon contained a large amount of barium and considerable gas.

A film taken on the eighth day showed the tip of the Miller-Abbott tube in the second portion of the duodenum. There appeared to be a small amount of gas in the slightly dilated bowel. A large amount of barium was seen in the large intestine. The right side of the diaphragm was elevated, and there were linear areas of atelectasis in the right lower lung field. The abromen remained somewhat distended. The Miller-Abbott tube was passed to the jejunum, as confirmed by x-ray, and the stomach was kept decompressed by a Levine tube.

The white-cell count on the eleventh hospital day was 31,300, and hemoglobin 12.6 gm. The blood protein was 6.0 gm. per 100 c.c., and the chloride 97.2 milliequiv. per liter. A portable film now showed considerable air in the stomach and some gas-filled bowel, presumably the colon. The Miller-Abbott tube lay over the lumosacral articulation.

The following day the patient passed dark blood by rectum and had some bloody drainage through the Miller-Abbott tube. He became pulseless, comatose and died.

DR. ROBERT T. PHILLIPS

This 51 year old factory worker was admitted because of abdominal pain. This was first described as upper abdominal distress, unrelated to the taking of food and with no reference.

On admission the patient was noted to be obese and possibly cyanotic. The abdomen was flat and silent. It was tender but not locally or remarkable so.

The blood pressure was normal. The wbc is elevated and rises steadly during the next 12 days to 31,000 just before death.

The electrocardiogram is normal on two occasions but the protocol leaves me with the impression that this man has coronary heart disease.

A roentgenogram of the abdomen showed considerable gas and fecal material in the proximal colon. The colon distal to the spheric flexure was collapsed.

A flat plate the next day showed dilated loops of small bowel—a barium enema revealed the passage of barium into cecuh and ileum without delay.

On the 6th hospital day following a rather vigorous and inconclusive G. I. series our patient went into shock. The following night he passed 50 cc of bright red blood from the rectum I hope.

So his wbc goes up and his chlorides and CO_2

come down and his serum amylase is normal means nothing anyway at this late date.

Follows more confusion the patient bleeds from the bowel again. On the 12th hospital day the patient expired.

Acute pancreatic necrosis occurs most often during middle life with equal frequency in men and women and is some what more common in the obese or alcoholic patient. Its onset is almost always sudden and is characterized by severe pain in the upper part of the abdomen frequently extending through into the back.

Pain may persist for days, it commonly is not adequately relieved by morphine. Nausea and vomiting are the rule.

On initial physical examination findings may be meager. The temperature pulse and blood pressure may be normal. Abdominal tenderness is moderate later to become more marked in the epigastrium. The amount of abdominal rigidity varies. Distention and shock may develop. Conclusive laboratory findings are elevations of the serum amylase and lipase valeric. The elevation in serum amylase occurs early and then falls to normal in 24-48 hours. The serum lipase may be elevated for 1 day.

Mesenteric vascular occlusion occurs more frequently in the male 9 to 4. Youngest patient 35, oldest 83, average 51.9.

The etiology is obscure but there is more often than not a definate relationship to one of the following cardiovascular diseases, blood dyserasias, intrabdominal infections causing mesenteric thrombophlebitis and trauma to the mesenteric vessels.

The correct diagnosis preoperatively, of mesenteric vascluar occlusion is unusual. This condition has been known to mimic any of the acute abdominal emergencies as well as acute myocardial infraction. One of the best diagnostic leads is the fact that, if after thorough study of the history physical finds and results of laboratory investigation the diagnosis is still very obscure, then mesenteric vascular occlusion should be considered seriously. The history may be highly suggestive, particularily if the patient is suffering from one or more of the conditions having a bearing on this etiology. The patient usually complains of a severe constant gnawing abdominal pain centering mainly in the mid portion of the abdomen. As peritonitis sets in, the site of the pain will shift to only the involved bowel. The bowel may be stimulated during the first few hours of the attack and then gradually become paralyzed. Prior to the stage of paralysis the patient may have diarrhea and pass blood per rectum. The passage of blood is of great diagnostic significance.

Physical examination is usually inconclusive. The findings vary markedly, depending on the duration of the illness and the extent of involvement. Early in the attack pain may seem to be out of all proportion to the meager abdominal findings. The patient may or may not be in a mild state of shock.

Abdominal examination may now disclose involuntary muscle spasm overlying the region of parietal peritonitis. The abdomen is silent. The wbc is usually elevated. Urine may be normal EKG and serum amylase are normal.

Rendich and Harrington say "The possible diagnosis of thrombosis of the mesenteric vesseis should be among those considered. When the plain x-ray of the abdomen discloses bowel dilated down to the region of the spheric flexure simulating a mechanical obstruction. If a subsequent barium enema reveals no obstruction, it is believed that the diagnosis may be ventured with some probability.

It is worth mentioning that as progressive narrowing of the mesenteric arteries occuring in other vessels the patient may complain of intermittent intestional claudication or abdominal angina. The aching gnawing periumbilical pain usually comes on one or two hours after meals and lasting during the intestinal activity of di gestion. If the patient is examined during this stage of his illness an abnormality will not be found to explain his abdominal pain. Howevei as narrowing of the arteries increases thrombosis may occur with resulting acute abdominal crisis from which he may or may not recover spontaneously. Klein suggests that the number who recover spontaneously from minimal lesions may be much greater than the number of patients who die from severe lesions. Pain commencing one hour after the evening meal is a common finding among cases reported in the literature.

The tip off in this protocol, I hope, the description of x-ray examination of the large bowel "showed considerable gas and fecal material in the proximal colon. The colon distal to the sphenic flexure was collapsed", "a barium enema on the second hospital day revealed the passage of barium to the cecum and terminal ileum without delay".

Based on this my diagnosis is mesenteric vascular thrombosis.

DR. PALMER DYSART

A 51 year old male factory worker developed vague upper abdominal distress accompanied by a cold. Although there were no marked related symptoms noted, it must be assumed that there was an associated weakness which confined him to his bed for the ensuing week until he was hospitalized because of an increase in the pain, at which time indefinite, equivocal findings were described upon physical examination.

An elevated white blood count was present which might have been due to an unlocated septic process, or a myocardial infarct which was indicated by electrocardiographic abnormalities which when repeated on the third hospital day was reported as being normal. X-ray studies of the gastrointestinal tract, although not diagnostic, indicated some poorly defined abnormality in the left mid-abdomen involving the small bowel either primarily or secondarily producing mild intermittent obstruction, and at one time suggestive of the presence of a bowel encircled mass.

Death occurred on the twelfth hospital day following a period of a few days in which intestional obstruction became a more prominent feature as evidenced by the statement that a Miller-Abbott tube had progressed into the second portion of the duodenum and then into jejunum. The stomach was decompressed by a Levine tube. Sepsis increased judging from a white blood count of 31,300 reported on the eleventh hospital day. On about the sixth hospital day 50cc of bright red blood were passed, and on the terminal day, dark blood was passed by rectum and drained through the Miller-Abbott tube. Until this time, loss of blood had not been great, for on the eleventh hospital day the hemoglobin was 12.6 gm., the only noataion of this in a rather lengthy resume. For this reason, I would assume that the repeatedly noted elevated white blood counts were not due to re-absorption of hemorrhage into the gastro-intestinal tract. Urine examination upon the seventh hospital day showed a two plus albumin, at which time some N. P. N. retention was present. Whether other abnormalities such as blcod were found in the urine was not stated, so we are forced to assume, possibly erronously, that they were not present.

"Vague", "indefinite", "equivocal", poorly defined", and "suggestive" are terms which I have applied to descriptions given, and four time have I "assumed". In spite of these assumptions, it would really be presumptious of me, because of the rather mild symptoms and non-specific findings, to infer that whatever ailed this man was not serious. But perhaps he died from something else. There is at least one thing certain about this case—he died of something fatal.

I think, in all seriousness, based upon an intestinal lesion accompanied by a very high white blood count, that I can say this case has the aroma of a B. Coli infection. Metaphorically speaking this odor is a figure of speech, but literally it may be a fact—and the evidence presented does indicate the probability of this.

Infection may be primary in which case mesenteric or retroperitoneal abscess, or even a perinephritic abscess could explain the possible bowel encircled mass in the left mid-abdomen. Or a pre-existent tumor mass in the location could become infected via the blood stream or lymphatics, as the result of invasion of the intestinal wall or from the urinary tract.

The initial symptoms and physical findings were uncertain and vague, yet on the second hospital day the gastro-intestinal x-ray findings were probably as definite and elucidating as any described, and had these findings been due to primary abscess formation, definite locallized tenderness, a palpable mass, and probably muscle rigidity should have been present, but they were not. Therefore, I am forced to conclude that infection acted as an aggravating factor in an already pre-existant lesion, resulting eventually in death which may have been due, at least partially, to intestinal hemarrhage.

If neoplasms are to be considered, all tumors, primary or secondary, of the entire gastro-intestinal tract must be included along with mesentreic, retro-peritoneal, kidney, adrenal, pancreatic, lymphatic and adjoining mesenchymal tissues and tumors metastasizing to these areas from distant organs of the body—which is a large order with no certain solution until necropsy.

Instead of clarifying the problem, such cogitation leads only to confusion, so here, a subject peculiar to the discussion of an intra-abdominal lesion will be introduced. As an enthusiastic supporter of Dianetics, the new science of the psyche conceived by L. Ron Hubbard, I have applied my analytic mind assiduously and re-

peatedly in this effort while books, journals and papers stacked higher and higher on my desk. until, according to this principle, I have lapsed into a state of dianetic reverie releasing my reactive mind to bring forth the engrams, which may be termed the past total experiences, to involuntarily assist in the solution of this problem. Dianetics is a remarkable science, having been termed by its author as a "creation which is a milestone for man comparable to his discovery of fire and superior to his invention of the wheel and arch".

I recall only last Monday a verbal postmortem at this table in which it was concluded, but too late, that more consideration of the temperament and professional interests of Joe Bank and less attention to the printed page would have helped to diagnose a case of hepatitis. I have tried this suggested line of approach, and having been personally acquainted with Tom Woodman for very close to 40 years off and on, realized that behind the seeming indefinite nature of this problem, it must fall into a definite pattern, and that the apparent vagueness of it was in reality the essence of it. So, returning to the case, and reviewing in a chronological order the facts as presented, an entirely new picture takes form. A 51 year old factory worker has had at least two attacks of angina pectoris in the past, so has narrowing of the coronary arteries which is allied to, and usually the associate of, preceding cardio-vascular disease; and at this age, we think of arteriosclerosis with super-imposed thrombus formation. An electrocardiogram upon admission to the hospital is indicative of myocardial damage which may result in more thrombus formation with its attendant danger of embolus. Although he had been cautioned to live a moderately restricted life, he removed storm windows which meant exposure and exertion. This marks the onset of his illness which is of a rather mild, ill-defined nature affecting the abdomen; but, as I have pointed out before, was apparently accompanied by a marked general weakness. Subsequently, intermittently, progressive intestinal obstruction with the presence of a probable poorly circumscribed intra-abdominal mass, varying extremely high white blood counts ensued terminating in a toxic death preceded by intestinal hemorrhage. This chain of events and conditions points to mesenteric vascular occlusion with infarction of small intestine. Fortunately, this condition when not incident to local infection or trauma is very uncommon. The mortality is extremely high either because of the state of extremis already present in a patient suffering from severe arrythmias or congestive heart failure with mural thrombus formation, or because the diagnosis and treatment have been too long delayed. Mesenteric vascular occlusion in the beginning may be either arterial or venous, but thrombosis in one type of vessel is generally followed by involvement of the other. The pathophysiologic changes depend upon the degree of ischemia present and the developement of collateral circulation. Primary arterial mesenteric occlusion is caused by emboli originating in the heart, aorta, or pulmonary veins and thrombus formation due to disease of the vessel walls. Venous occlusion is almost always due to thrombosis which may be the result of the venous type. Whatever the type or cause of the mesenteric blockage there are but two clinical pictures. The first is due to a sudden obstruction of a major mesenteric vessel with attendant infarction; the second is one of increasing ischemia, which may either subside or progress to the state of complete infarction, but the picture is identical, no matter how the occlusion developed. Sudden obstruction of of a major vessel in the mesentery is almost always due to advanced cardiovascular disease. Typically, the patients already suffering from a severe ailment of the heart dramatically exhibit abdominal catastrophe manifested by acute pain, nausea, vomiting, and profund shock. In occlusions that develop more slowly there are three clinical stages quite typically exemplified by the case under discussion: (1) a period characterized by hyper-peristalsis with colicky pain and nausea; (2) an interim of intestinal paresis that produces the syndrome of partial intestinal obstruction; and (3) a phase of total intestinal strangulation.

My diagnoses are: (1) Mesenteric vascular occlusion with intestinal infarction. (2) Coronary disease with cardiac intramural thrombi. (3) Arteriosclerotic vascular disease. If the pathologic findings do not agree with these diagnoses, don't condem the pathologist, for even he cannot be right all of the time.

DR. KARL S. HARRIS

This 51-year old factory worker's terminal illness was of about nineteen days duration and the diagnosis which most logically fits the symptoms is that of a mesenteric thrombosis. The original pathology and the ensuing chain of events seem much more obscure.

About one week before he was hospitalized, after removing some storm windows, he is said to have contracted a "cold" but had no chills, fever, chest pain or urinary distrubance but complained only of an indefinite upper abdominal distress. This apparently was quite severe as it caused him to remain in bed. Abnormal gastro-intestinal symptoms were lacking but after a week the pain became so severe as to require a hypodermic for relief and his physician felt he was serious enough to be hosp'talized. His admission findings are of little help—a questionable cyanosis of the lips and finger nails, a short systolic murmur over the aortic area which is not transmitted, electrocardiographic findings compatible with posterior wall inforct or a pericarditis, and a white blood count indicating an inflammatory reaction. He had had two episodes of precordial pain in the past diagnosed as anginal attacks. Gastro-intestinal x-rays showed a narrowed loop of terminal ileum apparently partly encircling a mass over the left side of the lumbosacral junction. Up to this point all of his symptoms could be accounted for on the basis of a coronary accident with pain referred to the abdomen and an ileus. However, on the third hospital day the patient had a spontaneous bowel movement and an EKG that day was normal. Thees findings would certainly be against a previous cardiac infarct. The patient apparently continued to have symptoms as other gastrointestinal x-rays were carried out on the fifth hospital day and I interpret their findings as a delayed passage of barium through the small bowel on the left side of the abdomen. Good results were obtained by enemas following the gastro intestinal series but on the following day the "gas pains" increased and soon after another enema the patient showed signs of shock. The subsequent passage of blood per rectum, the recovery of blood through a Miller-Abbott tube, the increasing signs of sepsis certainly indicate some intestinal lesion and this probably in the small bowel.

Lesions or affections of the small bowel may be claccified as (1) Congenital malformations—Absence of segments; reduplication; Meckel's Diverticulum; mesenteric cysts. Other than Meckel's Diverticulum these can probably be dispensed with because of the age of the patient. The symptoms of a Meckel's Diverticulum are more commonly that of appendicitis or a peptic ulcer. (2) Inflammatory Lesions—Enteritis, non specific; tubtrculosis; typhoid fever, etc. Our patient had no sympaoms to suggest this— no diarrhea, weight loss, etc. (3) New Growths—Polyps; benign lesions; malignant lesions. If any of these were present one would expect more obstructive symptoms. (4) Mechanical Lesions—Inussusception; volvulus; strangulated hernia; obstruction due to adhesions or extrensic pressure. (5) Vascular Lesions—Embolus; thrombosis; aneurism; periarteritis nodosum. (6) Other conditions that might be mentioned only are: basal pneumonia; perforated ulcer; acute homorragic pancreatitis; diverticulitis. The vascular type of lesion involving the bowel seems to best explain the illness of our patient.

Trotter collected in monographic form the reports of 360 cases of mesenteric thrombosis and embolism. Arterial occlusion was found to contribute 60 per cent of the total; thrombosis of the mesenteric vessels, the remaining 40 per cent. The superior mesenteric artery is more frequently concerned in embolism than is the inferior, partially because of its earlier exit from the aorta, but largely because of its more direct continuation from the abdominal aorta. Vegetations on the valves on the left side of the heart are the usual etiologic agents in embolism of the nementeric arteries. Mesenteric venous thrombosis is usually associated with infection in abdominal organs that are tributary to the portal vein. Appendicitis, pelvic infections and strangulated herniae are frequent precursors of the condition. Thrombosis or embolism of the mesenteric vessels most frequently occurs in adults between the ages of 30 and 70. Christopher stated in his textbook that "It is an interesting fact that many cases of mesenteric thrombosis run a fairly mild course, more than a week elapsing frequently before the existence of a serious lesion is suspected".

Our case could well be due to a superior mesenteric vessel thrombosis with extension of the thrombosis and fatal outcome.

Diagnosis: Mesenteric thrombosis.

DIFFERENTIAL DIAGNOSIS

Dr. Carroll C. Miller: This case seems to be covered with mystery and confusion concerning several of its details. A large part of the discussion concerns itself with the x-ray findings; none of these prove anything, and so far as I can figure out they do not help particularly in making a diagnosis. There are two points that we must ascertain in diagnosing such a problem

the location of the trouble and whether it is intrinsic or extrinsic, in relation to the gastrointestinal tract. If it is intrinsic, is it an infectious conditon or is it a vascular disturbance? If it is extrinsic, has it ulcerated into the bowel so as to provide us with an explanation of the symptoms and signs? We should like to know about the presence of abdominal tenderness and pain. The temperature is not recorded. The pulse essentially normal when the patient first came in, but after shocklike episode on the sixth day the pulse rose to 120. According to the chart before us, five or six days after admission the temperature rose from the normal to 101°F., by rectum and stayed more or less at that level without any appreciable change. There was a concomitant rise in pulse and respirations. So we do not have a definite picture of a rising curve or of an intermittent spiking one. We do not know what the hemoglobin was when the patient was first seen, so that we have no way of comparing the last note of 12.6 gm. with the former condition.

Since so much space in the abstract has been given to discussion of the x-ray films, it might be interesting to see them now.

Dr. Laurence L. Robbins: These films are arranged more or less according to the time relation in which they were taken. I have left out those that are not particularly pertinent. It might be said that perhaps the diagnosis should have been made by x-ray. I am not at all sure about that, however.

This is the appearance at the time the patient entered the hospital, with a large amount of fecal material on the right side of the colon. The next day, probably after enemas, we notice that the colon is fairly well cleaned out and that there is this air filled small bowel. The following day a barium enema was given, and the colon is apparently normal.

These are the loops of small bowel that were described as air containing, and you notice that the barium passes up to a point close to the air-filled loops. This loop of ileum appears to go around something. In the same area you see another loop of ileum that appears to overlie the questionable mass. This loop of bowel is definitely abnormal, I should say. So far as one can tell it is small and probably has some mucosal swelling. I cannot see anything that indicates a definite ulcer. Later films of the small bowel more or less confirm these findings except that there is nothing on which one can make a positive diagnosis of a mass at this time, and the suggestion of the loop of bowel constantly going around somthing is lost. In this area, hewever, the mucosa again appears abnormal and that is confirmed by this spot film. I have seen similar appearance in the mucosa of the sigmoid in case of periarteritis nodosa. I am not trying to lead anyone astray, but that is the only similarity I have seen.

Dr. Miller: How far away from the ileocecal valve would you say this was?

Dr. Robbins: About 75 cm. An exceptionally large amount of barium passed into the small bowel. I think you can be sure there is definite abnormality of the mucosa of the ileum.

Dr. Miller: Because of the repeatedly high white-cell count and the high percentage of neutrophils, we must assume that something fairly acute in the way of either sepsis or necrosis was going on, and because of a variation during the investigation, at times distention and at times collapse of the bowel, and also because of the terminal episode of hemmorhage into the intestine, we must presuppose that something was going on intraluminally, which allowed blood to escape into the bowel. It will be hard to make a diagnosis that satisfies both these conditions.

There are several things to think of, but we do not have enough evidence to rule them entirely in or out. A sigmoidal diverticulitis with abscess and rupture might account for localized peritonitis and for subsequent bleeding from the bowel. A mesenteric thrombosis would account for the signs of necrosis in the small intestine, accompanied by a high white-cell count and some degree of fever, The chart possibily consistent with that. It would also account for the terminal bleeding episode. It is not likely that this condition is malignant disease. In the first place, there was no previous history. The man was in reasonably good condition; in fact he was described as being somewhat obese. No masses were felt. However, acute abdominal emergencies are sometimes simulated by extensive metastatic lymph-node involvement in the abdomen because of sudden spread or rupture.

An internal hernia with strangulation of a loop of bowel might account for intermittent obstruction and eventual necrosis of thet segment of the bowel, with intraluminal bleeding. I should like to think of the terminal episode as being due to hemorrhage coming from mesenteric throm-

bosis or an internal hernia with strangulation.

The mass that this loop of bowel encircles might be either abscess or retoperitoneal tumor. It is not likely that any retroperitoneal tumor would also so involve the small intestine as to produce this picture. An abscess can involve the wall of the bowel causing obstruction and bleeding, although it is not likely that any retroperitoneal tumor would also so involve the small intestine as to produce this picture. An abscess can involve the wall of the bowel causing obstruction and bleeding, although it is not likely.

A condition that we often forget but which occurs fairly frequently is a Mechel's diverticulitis. In a Meckel's diverticulum there may be bleeding from a peptic ulcer, and it may also become infected with rupture. From the x-ray picture it is possible that an abscess had formed around a diverticulum of the small intestine and that the loop of bowel had become involved in that area; there might still have been a communication into the lumen of the bowel to account for bleeding by rectum and by the Miller-Abbott tube.

I think we must postulate an infectious process in the form of an abscess, with involvement of a loop of small bowel. I think as a best bet I shall say that this patient had a Meckel's diverticulum or a diverticulum of the sigmoid—a solitary one that was not seen by x-ray—accompanied by abscess and hemorrhage through erosion of a large mesenteric vessel.

Dr. Robbins: I am not at all sure I made myself clear to you, Dr. Miller. The small-bowel studies do not confirm the presence of the mass suggested by the barium enema; the films are not characteristic of bowel going around a mass.

Dr. Miller: Nevertheless, there is a loop that is abnormal, either by distortion or extrinsic pressure.

Dr. Robbins: It may be intrinsic disease.

Dr. Miller: Of course, a localized regional enteritis is possible, although it is not commonly seen so far back in the ileum as this. Furthermore, I do not believe that in cases of terminal episode such as this patient had, with almost no cachexia or general disturbance.

Dr. Edward B. Benedict: I do not see why this would not go with regional enteritis.

Dr. Robbins: Would one have acute episodes with it?

Dr. Benedict: No.

Dr. Miller: One does not as a rule see such a massive lesion as this man had. Furthermore, such patients are usually younger.

Dr. Richard H. Sweet: As Dr .Miller clearly brought out, I believe there must have been some necrosis of the loop of bowel to explain this picture.

CLINICAL DIAGNOSIS

Small-bowel obstruction.
Volvulus?
Intussusception?

DR. MILLER'S DIAGNOSIS

Meckel's or sigmoidal diverticulitis, accompanied by abscess and hemmorrhage.

ANATOMICAL DIAGNOSIS

Mesenteric venous thrombosis.
Infarction of small intestine.
Hemmorrhage into intestinal tract.
Peritonitis, acute, fibrinous.
Hemoperitoneum.
Coronary thrombosis, old.
Arteriscleros is, marked, generalized.

PATHOLOGICAL DISCUSSION

Dr. Benjamin Castleman: At the autopsy we found 3000 cc. of hemorrhagic fibrinous fluid and blood in the abdomen. The entire jejumum and most of the ileum, to within about 150 cc (6 feet) of the ileocecal valve were covered with bluish fibrin. Parts of the bowel were obviously gangrenous, and other parts showed beginning infarction. The cause of this gangrene was a mesenteric venous thrombosis. The arteries and arterioles were uninvolved. There was no periarteritis nodosa. The entire intestinal tract was filled with old and recent blood, apparently arising from the massive necrosis of the small bowel, which had terminally perforated into the abdominal cavity.

Most of the cases of mesenteric occlusion that we see are arterial in type and are caused by emboli. The venous type is uncommon and little is known about its etiology. In contrast to the arterial it does not usually come on suddenly with severe abdominal pain.

Dr. Robbins: Could you find evidence of old infarction?

Dr. Castleman: The thrombi were of various ages, and in some there was definite organization.

The patient also had an old thrombosis of the left descending coronary artery, which accounted for the anginal attacks.

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RESEARCH IN THE SERVICE OF MEDICINE **SEARLE**

THE *Secretary's* MESSAGE

GRIEVANCE COMMITTEE

Organized January 7, 1951, this Committee chartered a course designed to improve the doctor-patient relationship. Twenty-seven complaints were filed during 1951, one having been withdrawn by plaintiff because of insufficient evidence and another the result of legal action having been instituted. Of the remaining 25 cases, seven were referred to the Grievance Committee of Maricopa County Medical Society for processing and one to a like committee of Pima County

Of the 17 cases investigated, 16 involved "fees" or 94% which is in line with the national average, and one, "medical ethics". A detailed report of each case being compiled and a copy thereof will ultimately be filled with each component society secretary. The Committee received full cooperation from both member and non-member physicians involved, each abiding by its decisions and recommendations.

Experience prompts your Committee to offer the following suggestions for favorable physician consideration:

1. Reduce to a minimum the "waiting time" required of patients scheduled for office appointments. When an emergency arises, endeavor to contact patients before their departure for the doctor's office, rescheduling appointments.

2. Take time to explain patient's condition in understandable language. On first visit or as soon thereafter as practicable, interpret the physician's fees, giving the patient the opportunity to discuss ability to pay.

3. Where surgery is indicated, have complete understanding of fees involved and probable hospital costs including radiology, pathology and anesthesiology. In this latter instance, physician is urged to arrange consultation between the patient and anesthetist prior to operation. The patient should understand that the anesthetist too is an important part of the operating team and may expect to receive a separate bill for his fee.

4. Itemize monthly bills. Break down all laboratory charges. The patient is entitled to know what he or she is paying for. It is sound business practice.

Editorial

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The Editor sincerely solicits contributions of scientific articles for publication in ARIZONA MEDICINE. All such contributions are greatly appreciated. All will be given equal consideration.

Certain general rules must be followed, however, and the Editor therefore respectfully submits the following suggestions to authors and contributors:

1. Follow the general rules of good English, especially with regard to construction, diction, spelling, and punctuation.
2. Be guided by the general rules of medical writing as followed by the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION. (See MEDICAL WRITING by Morris Fishbein.)
3. Be brief, even while being thorough and complete. Avoid unnecessary words. Try to limit the article to 1500 words.
4. Read and re-read the manuscript several times to correct it, especially for spelling and punctuation.
5. Submit manuscript typewritten and double-spaced.
6. Articles for publication should have been read before a controversial body, e.g., a hospital staff meeting, or a county medical society meeting.

The Editor is always ready, willing, and happy to help in any way possible.

THE TREATMENT OF TUBERCULOSIS

SECTION I

A survey and summary of the current methods used to treat tuberculosis is appropriate at times—but almost mandatory now after the changes which have occurred in the past 3 to 6 years.

It is presumptive to attempt such a chore in less than a volume, but the information must be condensed and packed into two editorials for *Arizona Medicine.*

Numerous items in therapy have recently been modified, and even general principles have been changed. Resection and chemotherapy, for instance, were indefinite hopes until the past few years, yet they have changed the whole program of treatment.

Diagnosis can almost be called a part of treatment, since case-finding is the method by which the tuberculous person reaches medical care. The free use of x-ray methods, both in private practice and in mass surveys, is far more efficient than the former 'symptomatic diagnosis'—tho its efficiency is only as great as its usage. It should be commented that mass surveys profit not only the patient, but his contacts, the physician, and the roentgenologist.

Diagnostic methods are also recurrently used to determine the status of disease, and are therefore an integral part of treatment. Ordinary films, grids, sectional films, sputum concentrates, gastric aspiration cultures, 'resistance' tests are all valuable—and it is notable that several of these are relatively new.

Isolation and segregation are methods of managing tuberculosis, and they provide situations in which therapy can best and most safely be applied. There is no really good substitute for sanatorium care. Rest and exercise can be supervised, chemotherapy can be easily given, collapse therapy can be used as and when needed, contacts are protected, medical observation can be closer, etc. etc. Infectious disease precautions (aseptic technic) can be applied by trained tuberculosis nursing—and most of the literature on that subject has been written between 1939 and 1949. (These comments on segregation are made with the knowledge that such care is not regularly used or possible at present in Arizona. Patients often prefer to live at home; rest-homes are becoming fewer; and organized sanatoria can care for only a small portion of the crop).

Rest is still a major part of therapy. It has been somewhat displaced by additional methods, but it is combined with drugs, collapse, and

resection. Rest and time may perforce be the chief methods in some cases. The physical basis of rest is to decrease the volume and mobility of the lungs; the objective is to rest the body, and therefore the chest, the lung, and the lesion. There is evidence that *modified* rest, or less than absolute rest in bed, may be better for the patient's circulation, easier on the patient's chest, and just as effective in healing the disease.

Symptomatic treatment need not be mentioned in detail. There are few new drugs for the relief of the usual complaints. The chief progress has been in the cure of most symptoms and complications by the use of chemotherapy. Streptomycin and PAS have minimized cough, sputum, wheezing, pain, anorexia, diarrhea, effusion, empyema, and so on thru the systems of the body. One actually need only to try and avoid or control the symptoms from the drugs.

Supportive therapy has changed slightly, but is now more rational. Tuberculin, calcium, et al., are either harmful or not indicated. Diet must include sufficient protein, rather than the simply fattening substances. There is new evidence that, whereas all vitamins are required, vitamins A and C are more valuable in large amounts. About 25,000 units of A are needed, possibly in a special form, and 1 to 5 grams of C are sometimes indicated. The effect of excess vitamins may be exerted by improving the cellular resistance to the tubercle bacilli.

Suppressive therapy is the term used to describe treatment with the several specific drugs now at hand. The exact modes of action are not certain but they suppress the growth of the bacilli so that the body tissues may kill or surround them, or repair the damage they have caused.

Streptomycin and its cousin dihydrostreptomycin are the most valuable suppressive drugs available, and are equally effective. They are given parenterally, are helpful in all forms of tuberculosis, but are especially effective in lesions of the mucous membranes. The current preparations are relatively pure and innocuous. The hazards may include specific reactions (which are rare), toxicity, and the production of resistance in the bacilli. The controversy over the relative toxicity of the two drugs is unsettled; it is reported that a late deafness may follow the use of dihydrostreptomycin (the sulfate as well as the hydrochloride), and if this proves to be so the drug should be discarded. The bacilli may become resistant (less sensitive) to the streptomycins as their use continues, and the degree of resistance (which is usually permanent) depends on total dosage rather than time, and on the associated use of other drugs. Resistance is a serious hazard, tho not as common as first reported, and recent reports indicate that therapy may be continued with some benefit when cultures show considerable resistance. The question of dosage is nearing solution, with one gram being given every 2 or 3 days for chronic pulmonary and most other lesions. Some clinicians prefer daily doses of ½ to 1 gram during an acute or progressive episode, and pediatricians believe that streptomycin must be given intra-thecally to cure (or prevent) meningeal disease.

PAS is the set of initials loosely used to describe both Para-amino-salicylic acid and its sodium salt. PAS has been in use only three years in the United States, but it is agreed that the drug is valuable. It is believed that the sodium preparation is much better tolerated by the intestinal tract, either in solution or in enteric-coated granules. The chief toxicity is a direct irritation of the gastro-intestinal tract, but nerve symptoms or a benign rash may occur. Specific reaction to the drug occurs in about 3 per cent of those who take it, produces a typical syndrome, and can be relieved by desensitization. Bacillary resistance to PAS may follow many months of use, but it tends to fade on discontinuance. PAS has a definite intrinsic action against tuberculosis, with a frequent reduction of symptoms and an arrest of acute activity and mucosal lesions. Its greater importance, however, is in combination with SM for effect, and in preventing the development of bacterial resistance to SM by some as yet unknown means. It has been shown that 100 grams or more of SM can be given in combination with PAS with the emergence of almost no resistance. Further, the use of PAS daily is of greater protection than when it is given only on the days of intermittent SM dosage. Four or 5 grams three times a day seem sufficient, tho such a dose is more convenient than it is certified to be exactly enough.

TB-1 is a third anti-tuberculosis drug, but it is of the least value and scantily used. It is a thiosemicarbazone, an import from Germany (where it was called 'Conteben', etc.), and it is manufactured as TIBIONE in America. It

is often toxic in full doses (200 mg.), often poorly tolerated, and it has only a moderate effect on the most susceptible lesions. It is reserved for cases which cannot take SM, and it should be given in small doses under regular laboratory control.

Neomycin, viomycin, mycomycin, terramycin, et al., are either too toxic or too ineffective. There are several other drugs and combinations being tried thruout the world, but hopes should not be raised until they are approved by reputable medical societies. The American Trudeau Society, for instance, has a research and therapy committee which will investigate and report on any likely drug so quickly that the information would precede an available supply, and almost beat the announcements in the public prints.

(Section II, on collapse and resection therapy, will follow in a future issue).

TOPICS OF *Current Medical* INTEREST

RX, DX, AND DRS.

By GUILLERMO OSLER, M.D.

The vogue of 'TRACHEAL LAVAGE' in potential cases of tuberculosis doesn't sound solid or logical or physiological. . . . Instilling fluid into the bronchial tree, where it can carry secretions to new sites, where it produces a cough, seems unnecessary—especially when gastric aspirations can be done. . . . An analysis of the method should be available soon. So far only the pioneers and zealots have spoken, and they could not be called unprejudiced.

The real value of a new treatment for seborrheic dermatitis of the scalp (dandruff) should also be estimated. . . . A 2.5 per cent solution of SELENIUM SULFIDE in a detergent has been said to clear 80 to 95 per cent of the two conditions. . . . Physicians in institutions often hear such small complaints, and really know how common they are. They could use new therapy.

'Postgraduate Medicine' (and 'Time' Magazine) tell about the better TREATMENT OF DOG-BITE. Dr. R. T. Vinnard of Fresno, Calif., fumes at the use of the archaic cautery. Everyone wants to do enough, so too much is done. . . . Cleansing with soap and water is best, enough, and sufficient even when rabies is a possibility. . . . O.K. Now to convince the patients.

'Medical Economics' makes a good story out of the style and motives of FIVE LAY MEDICAL WRITERS. . . . The group includes DE KRUIF, of course. He is a Ph.D., the champion of 'souped-up' medical reporting; he doesn't give a darn what people think, but he seems to be mellowing. . . . STEVEN SPENCER has been mentioned in this column, and has written for the Sat. Eve. Post for 6 years. He wrote the first story on penicillin, won writing prizes, went to Harvard to study several basic science subjects. . . . GREER WILLIAMS writes conscientious articles for several journals, sometimes works with A.M.A. support. . . . ALBERT DEUTCH is a disturber, and proud of it. He hopes always to be the impassioned foe (racial bias, quacks, poor medical care of insane, etc.). He writes for a broad field, but has written books on medical history. . . . T. D. RATCLIFF dreams up some of his stories, gets leads from medical journals for others, and gets tips from research groups and drug houses for most of his leads. In this last category was 'Dervisul', a potential cure of polio, which he reported and readily admits was a dud. (It was referred to here, and noted to be a dud a year ago. However, we BOTH could have been right, and ONE of us would have become famous).

STEVEN SPENCER of the Sat. Eve. Post deserves another pat for his handling of "Food Poisoning Can Get You, too" . . . He points out the frequency of mass attacks (400 reported per year, affecting 9,000 persons—probably only 10 per cent of the actual episodes). . . . He mentions the most commonly contaminated foods (meat, 35%; filled bakery products, 35%). . . . He stresses the frequency of staphlococcus intoxication over botulism, mushrooms, salmonellae, etc., and describes the huge growth of the bacteria in food which is allowed to remain at room temperature for a few days or hours. The toxin from the bacteria is the reason for its quick action and lack of infection. . . . 'Case-reports' make the article very readable.

The Feighner & Co., manufacturers of surgical equipment, presents a STERILE OPERATING LAMP which can be precisely focused on an operative area. . . . It consists of a source of light, and a lucite bar which is interchangeable and may be sterilized. It is also spark-proof and cool.

A columnist (J.F.) for the Ohio State Medical Journal calls attention to a MODERN MEDICAL HAZARD to children. . . . In days of yore medicines had to be bitter to be popular. Nowadays the drug houses compete to produce palate-tickling and provocative drugs, especially for the

small fry. . . . The hazard is present in the possibility of over-dosage—too much of a good thing.

The title of an article in the August 'Annals of Surgery' could be misleading to a chest specialist. It is called 'EMPHYSEMATOUS CHOLECYSTITIS'. . . . Retterbush, et al., report 21 cases of air in the gall-bladder, or in its wall, associated with acute inflammation. Symptoms are similar to, but x-rays different from, ordinary acute cholecystitis. A gas-producing organism, usually of the clostridium group, is the cause. Surgery is the recommended therapy, and quickly.

The Medical Annals of the District of Columbia says that AVOIDANCE OF MALPRACTICE depends on 'Three Little Words'.—knowledge(diligence, and judgment. . . . If one has and uses 1. sufficient knowledge and skill, 2. due diligence, and 3. best judgment, there is no chance of a guilty verdict in lawsuits.

Two groups of surgeons (with Thorek and Dennis) have performed VAGOTOMIES on a total of 63 cases of idiopathic ULCERATIVE COLITIS. The results are said to be good, with 80.9 per cent of Thorek's cases showing a favorable result. . . . Drs. Bargen, Lahey, and Palmer (who have seen dozens of therapies come and go) are not enthusiastic about the logic or effects. They, and we, must wait and see. . . . Come to think of it, Bargen is usually enthusiastic.

'Medical Economics' has survived the status of medical PROFESSIONAL COURTESY, and very well too. It varies in different areas, probably, but another modifying factor is the amount of the charge. . . . A medical colleague and his wife are invariably extended 100 per cent courtesy at any cost. Eighty-five to 95 per cent of office aides are exempt, and the remainder pay reduced charges. More than 50 per cent of nurses pay no fee, and most of the others pay little. More than a third of the dentist patients pay nothing, and many more pay less than full fee. Druggists also receive some 'courtesy', tho less than dentists.

The medical director of a large western tuberculosis sanatorium makes two interesting comments. . . . Patients often LEAVE AGAINST ADVICE and their number varies inversely with the number of physicians on the staff. (Few physicians, many AWOLS). . . . The DRUG BILLS vary directly with the number of physicians on the staff.

ANTIBIOTIC NOTES,—ACTIDIONE, once reported as promising in fungus infection, is reported to have cured a case of cryptococcus meningitis (torulosis).

German obstetricians tell of a synergism which is more effective in puerperal infection—PENICILLIN AND STREPTOMYCIN.

TERRAMYCIN gains in stature in reports on gonorrhea, a wide range of urinary infections, primary atypical pneumonia in infants, pleuropneumonia-like infections, mouse pinworms, and acute intestinal amebiasis.

There are few more certain ways of disproving the value of a drug than by having the condition develop while the drug is being used. . . . We have recently seen a case in which CHLOROMYCETIN was being used by mouth for a specifically sensitive staphlococcus empyema. The patient developed a SERUM HEPATITIS during this period, probably from a series of transfusions given 7 or 8 weeks previously. . . . The lack of prophylaxis confirms recent reports on the use of this drug, as well as of aureomycin.

The reduction of BACTEREMIA AFTER TOOTH EXTRACTION has become easier as the modern drugs become available. The 'mycin' drugs have the advantages of low antigenicity, oral dosage, lower cost, and (it is now reported) greater efficiency. . . . Dr. William S. Middleton of Wisconsin, recent president of the A.C.P., once said that it would soon become criminal to pull teeth without the protection of chemotherapy. Now seems to be the time, especially in cases with lesions of the heart valves. . . .

One of the leading authorities and authors on THE USE OF SULFONAMIDES was Dr. Wesley Spink of Minneapolis. He summarized the 'Present Status of Sulfonamide Therapy' last year, and it is still worth a paragraph. . . . The decline in use has been due to 3 causes,—serious side effects (especially renal) and hypersensitivity; production of bacterial resistance; and a narrow range of bacterial activity, now widened by the antibiotics. . . . There are quite a few conditions for which the sulfonamides (now limited to sulfadiazine and sulfamerazine) are indicated. 1. Meningococcic infections (by mouth, both drugs); 2. Bacillary dysentery; 3. Mild respiratory infections (unless bacterial study says otherwise); 4. Urinary tract infections (especially for chronic gram-negative involvement); 5. Ulcerative colitis (with the poorly absorbed preparations). . . . The PROPHYLACTIC USE is justified for rheumatic fever, epidemic meningococcic meningitis, and urinary tract infection during catheterizations. (Antibiotics are used in other similar situations, and in some of these). . . . SULFONAMIDES PLUS ANTIBIOTICS are helpful in influenzal meningitis (sulfadiazine, streptomycin, and antiserum); pneumococcic meningitis (penicillin plus a sulfonamide); Pseudomonas GU and skin infections (streptomycin and a sulfa); brucellosis, Friedlander's, and plague may or may not be best treated with SM and a sulfa. . . . As in the past these rules are subject to change at short intervals.

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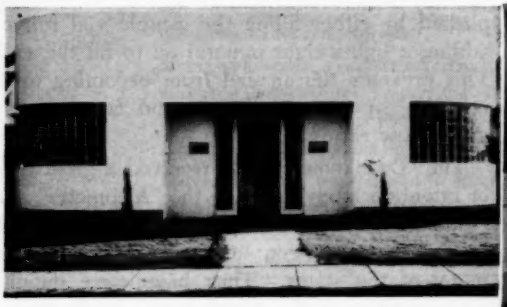

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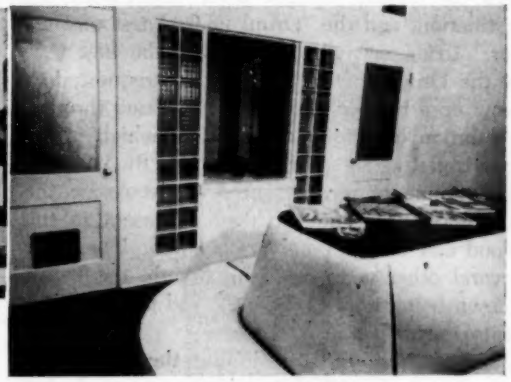

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SOBRIETY TESTS

Edward L. Breazeale; R. L. Whitlow
James Wyckoff
Tucson, Arizona

There has been a recent increased interest in the various tests for intoxication, especially since the state has adopted the Standard Traffic Code. A great deal of discussion has gone on, both for and against these tests and consequently, a great deal of misunderstanding has come about regarding their reliability.

There are several types of chemical tests for sobriety available today. Probably the best known of these are the blood alcohol test, where a sample of the suspect's blood is drawn and the actual alcohol level determined by distillation, and the "Drunkometer" test of Harger. Urine may also be used in the first test. In the Drunkometer the suspect is requested to blow up a balloon and the air is passed through a solution of acid permanganate, which is decolorized by the alcohol present. By knowing the volume of air necessary to decolorize the solution the amount of alcohol present in the blood can be accurately calculated. There are several other tests involving breath, the better known being the "Alcometer," and the Forrester "Intoximeter."

All of these tests, including the blood and urine tests, depend upon the fact that alcohol in a person's body is distributed throughout the bodily fluids in a uniform pattern. This is true of the level in the blood, urine, saliva and perspiration. Consequently, the expired air will be in equilibruim with the blood and the alcohol in the breath will be in proportion to that found in the blood itself. The basic chemical principle behind all the tests is the same, the reduction of some oxidizing substance by the alcohol, which goes over to either acetic anhydride or acetic acid. Potassium permanganate and either sodium or potassium dichromate are the most common oxidizing agents and indicators used in these tests.

The basic standard of reference is the level of alcohol per unit volume in the blood, spinal fluid or urine of the suspect In the case of these samples a known quantity of protein free extract is distilled into standard dichromate solution and the amount of dichromate reduced, determined either by titrating the excess of dichromate or using a photolometer and determining it colormetrically. This method is direct and accurate, except that the presence of methyl alcohol will act the same as ethyl alcohol. However, in the eyes of the law the suspect is still 'under the influence," regardless of which alcohol is present, if the concentration is above 0.15%. The method does have some drawbacks. Blood samples are not always easy to obtain and laboratory facilities are not always available and the method of determining the alcohol level in the blood is not standardized sufficiently so as to eliminate errors in the performance of the test. A blood sample if it is not to be analyzed immediately should be kept cool and be excluded from air. This may be accomplished by either filling the sample vial full or adding a lightweight mineral oil to fill the vail. This prevents the alcohol from becoming oxidized by exposure to the air and consequently giving low results.

The "Drunkometer" has received a great deal of attention lately, as have the "Alcometer" and "Intoximeter." These methods are all breath tests and have been adopted as standard in many of the states. They have some definite advantages over the blood tests, chiefly that a trained chemist is not needed to run the test and a chemical laboratory is not required. Any law enforcement officer can easily learn how to run them after some instruction.

The "Drunkometer" uses a cross check in that it not only measures the volume of air directly by water displacement but also by weighing the amount of carbon dioxide in that volume of air. After the air has passed through the permanganate solution, decolorizing it, it then passes through a calcium chloride tube to remove any moisture and then through an ascarite tube that absorbs all carbon dioxide. The increase in weight of the ascarite tube is determined by means of an analytical balance. Knowing the amount of carbon dioxide the volume of alveolar air can be determined and consequently, the percentage of blood alcohol. The Harger Drunkometer furnishes tables so that the percentage of alcohol can be read directly from the weight of carbon dioxide. The test has the advantage of being easily run and is quite accurate. Each test is cheap, but the equipment is relatively expensive (about $500 complete) and bulky to transport.

Contrary to common beliefs there are very

1. Asst. Agric. Chemist, Univ. of Ariz., Tucson.
2. Captain, Southern District, Arizona Highway Patrol, Tucson.
3. Patrolman, Southern District, Arizona Highway Patrol, Tucson.

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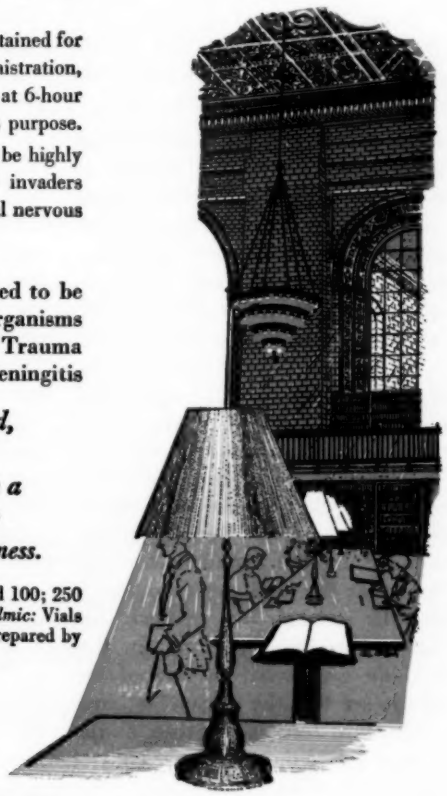
Capsules: 50 mg.—Bottles of 25 and 100; 250 mg.—Bottles of 16 and 100. *Ophthalmic:* Vials of 25 mg. with dropper; solution prepared by adding 5 cc. of distilled water.



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few debilities that will give false readings. Diabetis will not cause a reaction in the tube as is commonly thought. Certain types of medicines will cause the body to produce reducing bodies. Some of the local anesthetics used by dentists are likely to cause false positive tests. Therefore, it is extremely important that a suspect be questioned as to the possibility of his being under a doctor's care or whether he has been to a dentist that day. If he has, it is advisable to use a blood test for checking on the sobriety of the suspect.

The breath tests have been used for a number of years throughout the United States and parts of Europe. They have been subjected to numerous court trials and have been upheld by the highest courts in our country. If properly conducted they are accurate and acceptable as evidence, and there is no reason why the tests should not be properly run and widely used.

The prime purpose of all chemical tests for drunkeness is to determine if the suspect is "under the influence." This works both ways, it can either help to convict or it can help to clear a person. Often times it does the latter. Following an accident a person may have received an injury with the result that he will have impaired speech and movement and will appear to be intoxicated. Often times even an expert doctor of medicine cannot distinguish clinically, but the chemical tests can and do tell the difference. This type of case is as important to the officer as is the true inebreate; he is as interested in clearing the innocent as he is in convicting the guilty. Recently a suspect was examined by the Drunkometer and found to contain near the fatal concentration of blood alcohol. His stomach was pumped and almost a quart of whiskey removed. In this case the man's life was saved by use of the test. It is plain to see that the slogan "get your man with the chemical test" is not true, as the use of these tests can either clear or convict a person if impartially done.

It has been recommended by the National Safety Council Committee on Tests for Intoxication and the American Medical Association Committee to Study Problems of Motor Accidents that the effects of alcohol in the blood in concentrations below 0.05 per cent are insufficient for a diagnosis of "under the influence of alcohol." Concentrations between 0.05 per cent and 0.15 per cent are usually associated with a loss of some of the clearness of intellect and self-control that a person would ordinarily possess. However, quantities of alcohol over 0.15 per cent constitute prima facie evidence of "under the influence."

By "prima facie" is not meant absolute, but rather "true until proven otherwise." It is up to the suspect to prove he is not "under the influence."

The Purves-Stewart tables, as given in the Edenburgh Medical Journal (44:633, 1937) as shown on following page.

The question often comes up as to the individual tolerance for alcohol. Individuals will vary in their tolerance or "ability to carry their liquor," yet that has to do with their rate of assimilation and not necessarily alcohol content. The figure of 0.15% is an extremely fair figure and represents a level where most people's reaction time will be reduced.

Recently the writers in co-operation with the local Arizona Highway Patrol (Capt. R. L. Whitlow and Ptl. James Wyckoff) has been developing a rapid portable test for intoxication. It involves the use of saliva and a reducible agent. The suspect is requisted to give the operator some saliva in a small paper cup. One-half cubic milliliter is then added by a calibrated pipette to a standard test solution. The sample vial is held in the hand for 4 to 5 minutes and compared to known standards. In preliminary tests it has proven very accurate and rapid. The cost per test is only a fraction of a cent and the complete kit is about the size of a small box camera.

The use of chemical tests for intoxication is no longer in the experimental stage. It is a real help to the law enforcing officer and should be used. "Although a single test is sufficient as evidence, it is strongly urged that at least two types of tests be performed. It is recommended that the breath test be used as preliminary and if the case warrants, a blood or urine be collected for confirmation analyses." The latter statement was taken from a report of the National Safety Council Committee on tests for Intoxication dated January, 1951.

500 to 400 mg. per 100 cu. cm. (decilitre) of blood	(.50 to .40%)	Coma ("Dead drunk"). Sometimes fatal
350 mg.	(.35%)	Stupor; inability to stand or walk.
200 mg.	(.20%)	All cases (i.e.) (100 per cent) show marked inebriation with psychic and speech disorders; also motor symptoms (cerebello-pontobulbar).
180 mg.	(.18%)	80 per cent of cases show clinical signs of moderate intoxication, including diminution of control, mental confusion and disorders of co-ordination.
160 mg.	(.16%)	66 per cent show similar clinical signs.
130 mg.	(.13%)	50 per cent show similar clinical signs.
100 mg.	(.10%)	33 per cent show slighter pathological symptoms; talkativeness, euphoria and abnormal confidence.
80, and downward to 30, 20 and 10 mg.	(0.03, 0.02, 0.01%)	Show no gross clinical abnormality of behavior.
80 and downward to 30, 20 and 10 mg.		But toward the higher figures careful testing reveals delayed reaction time (0.4 second instead of 0.1 second) followed by hasty acceleration when driving a car, together with diminuation of judgment, attention and control; also loss of efficiency in finer performance tests. The individual is more genial and has fewer inhibitions. (*in vino vertias*)
0 mg.		As in the normal abstainer ,but also in many cases of delirium tremens.

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1952 SCIENTIFIC ASSEMBLY AMERICAN ACADEMY OF GENERAL PRACTICE

All eyes shift eastward to Atlantic City, New Jersey, where the 1952 Scientific Assembly of the American Academy of General Practice will be held March 24-27.

Dr. R. B. Robins of Camden, Ark., will be installed as new president of the Academy succeeding Dr. J. P. Sanders of Shreveport, La. Other officers for the current year are Dr. Fred A. Humphrey of Fort Collins, Colo., vice-president, Dr. William B. Hildebrand of Menasha, Wis., chairman of the Board of Directors, and Dr. U. R. Bryner of Salt Lake City, Utah, treasurer. Dr. J. S. DeTar of Milan, Michigan, is speaker of the Congress of Delegates.

On the Monday, March 24 program, Dr. John W. Cline, president of the A.M.A., Leonard E. Read, Louis B. Seltzer, and Rollen Waterson will discuss the relationship of the general practitioners and the public. Drs. O. Spurgeon English and Richard Kern are teamed up for important lectures on the "problem ages."

The question of "problem drinking" will be featured in a symposium on the Tuesday morning program. Mr. W. G. W. from Alcoholics Anonymous, Dr. Harold Lovell, and Seldon D. Bacon, Ph.D., will give lectures. Academy member Andrew S. Tomb will be moderator at a forum session with Mr. W. G. W., Drs. Lovell and Bacon, Rt. Rev. Clinton S. Quin, D.D., George H. Gehrman, M.D., and Milton G. Potter, M.D., taking part. Lectures on obstetrics will be given by Drs. Robert B. Greenblatt, George J. Thomas, and M. Edward Davis. Dr. William Dameshek will speak on Anemia to complete Tuesday's program.

Six outstanding authorities will present Wednesday's program on Progress in Medicine. They are Drs. John C. Krantz, Jr., Julius H. Comroe, Wallace M. Yater, Cyril M. Macbryde, Hans Selye, and Jerome W. Conn. These six will make up an "Information Please" session with Dr. Harry Gold as moderator.

The final Assembly lectures will be on Orthopedics Thursday morning with Drs. William T. Green, J. Albert Key, David M. Bosworth, and Rex Diveley in charge.

A record attendance of 4,000 persons is expected at the Assembly's social highlight, the banquet, which will be held Wednesday evening. All sessions of the Assembly, the exhibits, and the banquet will be held in Atlantic City Convention Hall.

——o——

BOOK REVIEW

Standard Nomenclature of Diseases and Operations—4th Edition Edited by Richard J. Plunkett, M.D., Editor and Adaline C. Hayden, R.R.L., Associate Editor.

4 Illustrations; 1,034 Pages; January 2, 1952. $8.00.

This 4th edition of the standard guide to disease and operation recording for medical record librarians and physicians has been completely revised and brought up-to-date in keeping with medical progress.

Code numbers for acute and chronic conditions are made consistent, new heart diagnoses are included, diseases of the Hemic and Lymphatic systems are revised to conform to accepted terminology, the dental and tuberculosis sections are enlarged, and the section on operations includes new operative procedures used in skin grafts and cardiac surgery. Also, the supplementary terms are placed in one section and the disease and operations indexes are placed consecutively in the book.

In addition to these revisions, an International Statistical Classification of Diseases, Injuries and Causes of Death is included. These code numbers are cross-referenced to the "Standard" code numbers.

This 4th edition is the result of three years of extensive work by an editorial advisory board and 21 committees representing each of the individual or specialty sections of the book.

CONTENTS

Preface, Introduction, Instructions to Medical Record Librarians, Schema of Classification, Nomenclature of Diseases, Nondiagnostic Terms for Hospital Records, Supplementary Terms, Operations, Introduction; Classification of Operative Procedures, Nomenclature of Operations, Anesthesia Section, Disease Index, Operation Index, Appendix—Code Numbers of International List of Causes of Diseases, Injuries and Causes of Death Cross-Indexed to "Standard" Code Numbers.

The Blakiston Company, Philadelphia 5, New York 22, Toronto 2.

HOSPITAL ACCREDITATION COMMITTEE MEETS

The first meeting of the new joint commission for the accreditation of hospitals in the United States and Canada was held at Chicago's Drake Hotel on Saturday, December 15. It was primarily an organizational meeting.

The joint commission will be composed of 20 members since it also will represent the Canadian Medical Association. Making up the commission will be six representatives each from the American Medical Association and the American Hospital Association and three each from the American College of Surgeons and the American College of Physicians. The two members from Canada are Dr. E. K. Lyon, Ontario, representing the Canadian Medical Association, and the Hon. John Melton George, K.C., Manitoba, Canadian member of the American Hospital Association.

At the first meeting, a screening committee was appointed to process those who are being considered for the job as executive director of the commission.

Dr. Gunnar Gundersen, La Crosse, Wis., a member of the A.M.A. Board of Trustees, was elected chairman of the commission: Dr. Roy Sloan, Chicago, of the American College of Physicians, was named vice chairman, and Mr. Steward K. Hummel, Joliet, Ill., of the American Hospital Association, treasurer.

NOTE: Reprint, AMA Secretary's Letter No. 204—1-2-52.

JOURNAL SHOWS UP APATHY IN VOTING

Every doctor should read the editorial, "Voting Privileges," which appeared in the December 29 issue of The Journal.

It showed up the apathy of the citizens when the elections roll around.

The editorial cited one source which estimated that less than 50 per cent of the qualified United States voters exercise their privilege of voting in national elections.

According to a survey made by a Poll Tax Committee in Dallas, the heaviest vote among professional groups was found in the legal profession, but even in this group only 38 per cent of the lawyers voted in 1948. The poorest showing made by professional groups was in the nursing profession, in which only 12 per cent voted. In the medical profession, 36 per cent of the physicians voted. The Dallas Morning News said:

"It is the doctor, the lawyer, the engineer who bemoan the threat of socialism and burdensome debts. The doctor who fears socialized medicine and does nothing to combat it is legion. The Dallas poll merely proves, locally, a national picture that is pitiable."

Dig out your 29th issue of The Journal and read the editorial. It will be worth your while and will set you to thinking that "socialism can easily come to this country without a vote from the people; it can come by default."

NOTE: Reprint, AMA Secretary's Letter No. 204—1-2-52.

HILL-BURTON GRANTS STATE OF ARIZONA

Division of Hospital Facilities, FSA, reports that as of November 30, 1951, no new projects had been approved for Hill-Burton grants in the State of Arizona.

Status of all Hill-Burton hospital construction in this state is as follows:

COMPLETED AND IN OPERATION: 5 projects at a total cost of $2,540,593, including federal contribution of $732,562 and supplying 195 additional beds.

UNDER CONSTRUCTION: 3 projects at a total cost of $6,628,089, including federal contribution of $1,900,000 and designed to supply 426 additional beds.

APPROVED, BUT NOT YET UNDER CONSTRUCTION: 0 projects.

NOTE: Monthly progress statement of the Washington Office of the American Medical Association, December 17, 1951.

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AMA LOS ANGELES MEETING

The Fifth Annual Clinical Session of the American Medical Association, held in Los Angeles December 4-7, was an outstanding success in attendance and in interest in the program. The attendance exceeded that of any of the previous Clinical Sessions. The number of physicians who had registered by the final day of the meeting was over 4,400. Registration of physicians from Arizona as of December 6, 1951, was 39. Swelling this attendance were more than 4,600 guests, including residents, interns, medical students, nurses, and technicians. While the program had been carefully arranged to provide special interest for general practitioners, there was a sufficient variety of subjects and activities to appeal to others than physicians. The scientific and technical exhibitors were pleased with the attendance and interest shown by those who attended the meeting.

There were clinical demonstrations and lectures on more than 300 subjects, a scientific exhibit of 90 or more displays and demonstrations, and motion pictures and television embracing many topics. Medical and television history was made when colored television was first shown on a coast-to-coast hook-up. Originating in Los Angeles, this demonstration was seen by medical audiences in this city and simultaneously in Chicago and New York. While the possibilities of television for teaching have long been discussed by physicians interested in visual education, no transcontinental arrangement of colored television had ever been attempted before. The results demonstrate beyond question the potential value of this medium for education.

Numerous sessions were devoted primarily to pediatrics, dermatology, diseases of the chest, cardiovascular diseases, obstetrics and gynecology, general surgery, general practice, urology, industrial medicine and surgery, eye, ear, nose and throat, radiology, anesthesia and pathology, traumatology as related to civilian defense, and medical blood banks. Other sessions included general lectures of interest to all physicians, which were presented by widely known speakers.

By action of the Board of Trustees, an appropriation of another half million dollars to the American Medical Education Foundation, which has been raising funds within the medical profession during the last year for the nation's medical schools, was made.

Among the visitors to the House of Delegates of the American Medical Association was Donald R. Wilson, Clarksburg, West Virginia, national commander of the American Legion. In an inspiring address he paid tribute to the American physician and his determination to provide basic answers to the problems of medical care facing the people of this country. He warned that the medical profession must be the watchdog of American health and that the American people must look to it for leadership, planning, and results. He said in part: "You may depend on us to carry our full share of what is primarily your battle. We shall do it not only for your good but also for the good of the American people. We see and understand your problem and are prepared to render whatever service we can."

Woman's AUXILIARY

"WHAT'S NEW IN THE COUNTY AUXILIARIES"

This year the Maricopa County Medical Auxiliary voted to sustain Nurse Recruitment as its project.

When the various state nursing associations heard of this, they, with their similar aims, joined forces with us. We hope that with this combined strength every facet of the community will be reached. Some time in March when all the plans are laid, we expect to contact business houses, schools, organizations and hospitals to secure their aid in getting new recruits. Part of this program will be the showing of films, speakers, programs, and all of the devices possible to show the tremendous need as well as the attractiveness of the job of being a nurse.

Along with filling this need, the women of our auxiliary provide manpower for many community services such as Red Cross, sale of T.B. stamps, Polio work and drives, Community Chest and our P.T.A. Visiting Nurse Service provides a good example of this. Two members

spend a minimum of three hours each a week to help in mending, clerical work, making supplies or anything that is needed at the time. The needs of the visiting nurses are so great that it isn't unusual to find our members typing or mending for their service in their own homes.

No account of our service to the community or the Medical Society would be complete without a mention of a job well done by Mrs. George Enfield and other members of our group who helped to start a new Medical Auxiliary—Graham County. Congratulations! We hope you have a long and successful career in service before you.

Mrs. John S. Kruglick
Publicity Chairman, Maricopa County

This has been a very satisfying and interesting year thus far for the Pima County Auxiliary.

The main project for the year has been the radio program, "Healthy Living in our County." I will not attempt to go into that subject now, as it will be reported on and explain in detail in the March issue of *Arizona Medicine*. However, I would like to say that it is a success and something that the Auxiliary can be proud to have sponsored and been responsible for.

The Auxiliary was asked to have a representative on the Council of Social Agencies, which we were happy to do. Our work with and through them has been most gratifying.

The monthly programs have been exceptionally good. At the membership luncheon in November, a humorous skit was given which portrayed the role played by the doctor's wife in the home and community, in three different episodes dating from 1900 to 1950.

The January meeting which was on Legislation was also given in the form of a skit with the members taking all the parts, even acting as inanimate objects. The process of how a bill is brought before the house and senate and becomes a law was acted out in pantomine with a narrator explaining the different steps.

Lack of space forbids me going into more detail about all of our activities, but I do want to say that I think the Auxiliary is accomplishing more in its relationship with the public than ever before.

Mrs. Hiram Cochran
Publicity Chairman, Pima County

It was the pleasure of the new auxiliary group in Safford, Graham County, to meet on December 4, 1951 and witness the installation of officers by members of the State Auxiliary. Mrs. Royal E. Rudolph, president of the State, conducted the ceremony assisted by Mrs. William Schoffman, and Mrs. George S. Enfield. They presented the group with the aims and projects of the State and National Auxiliary and suggested fields of endeavor which could be started by a young and active auxiliary.

The officers chosen for the Graham County Auxiliary are: President, Mrs. Frederick W. Knight; vice-president, Mrs. Noel G. Smith; secretary-treasurer, Mrs. Donald E. Nelson.

The Woman's Auxiliary of the Graham County Medical Society was organized December 4, 1951 in Safford, Arizona. The group is small but has prospects of adding to its membership.

The first meeting was held January 8, 1952 at which time plans were laid for studying an activity program to be carried on by the members. These projects were decided upon: 1. Investigation of the health problems existing in the county; 2. Publicizing "Today's Health" and soliciting subscriptions; 3. Sponsoring monthly health programs on the radio to be given by children from the schools in Graham County.

There are many lines of work which may be followed in the future, one of them being to stimulate young girls in the junior high age group to take the nurse's course. The community has a need for nurses; and in view of the increasing study of Civilian Defense, a group of young women trained in the nursing profession is not only desirable but necessary to the community. It is hoped that this year will see our main projects accomplished, and steps taken toward others.

Mrs. Frederick W. Knight
President—Graham County Aux.

Yavapai County has had only two meetings since last May and have not started any project. Outside of giving food and toys to the poor for Christmas we haven't been very active. We will start some projects after Christmas.

Mrs. Ernest A. Born, Prescott, Arizona

Gila County will have for its project this month "Help for the Crippled Children."

Mrs. Nelson D. Brayton, Miami, Arizona
Publicity Chairman